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Supplement of

A 334-year coral record of surface temperature and salinity variability in the greater Agulhas Current region

Jens Zinke et al.

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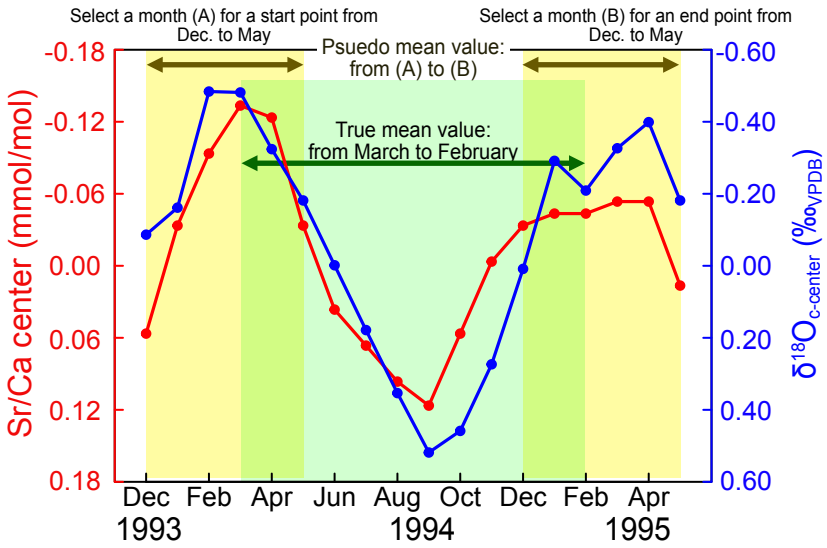

Figure S1 – Pseudo-proxy time series to test for sampling errors in mean annual Sr/Ca, $\delta^{18}O$ and $\delta^{18}Osw$ for years 1993 to 1995. Schematic illustrating the pseudo-proxy approach.

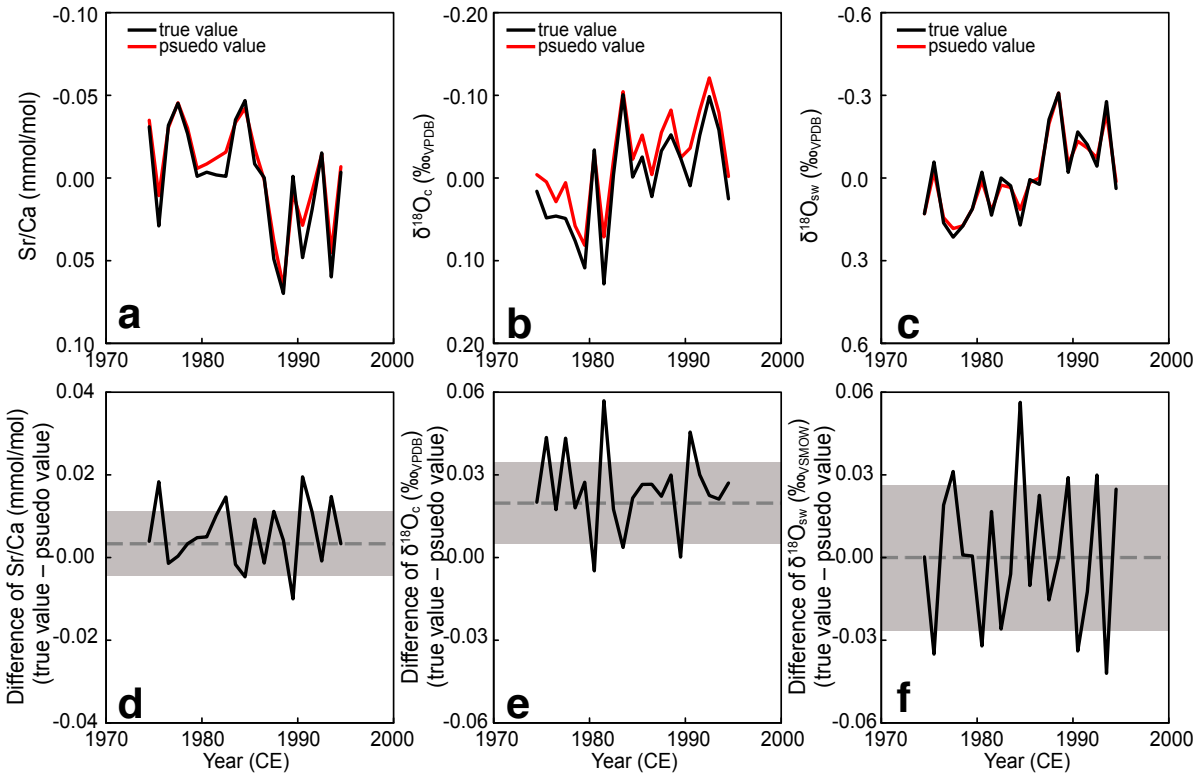

Figure S2 - Time series of coral Sr/Ca (a), $\delta^{18}O_c$ (b) and $\delta^{18}O_{sw}$ (c) taking into account randomly varying sampling errors in start and end date for each year based on approach in Fig. S1 and their difference from true measured Sr/Ca (d), $\delta^{18}O_c$ (e) and δ^{18}Osw (f).

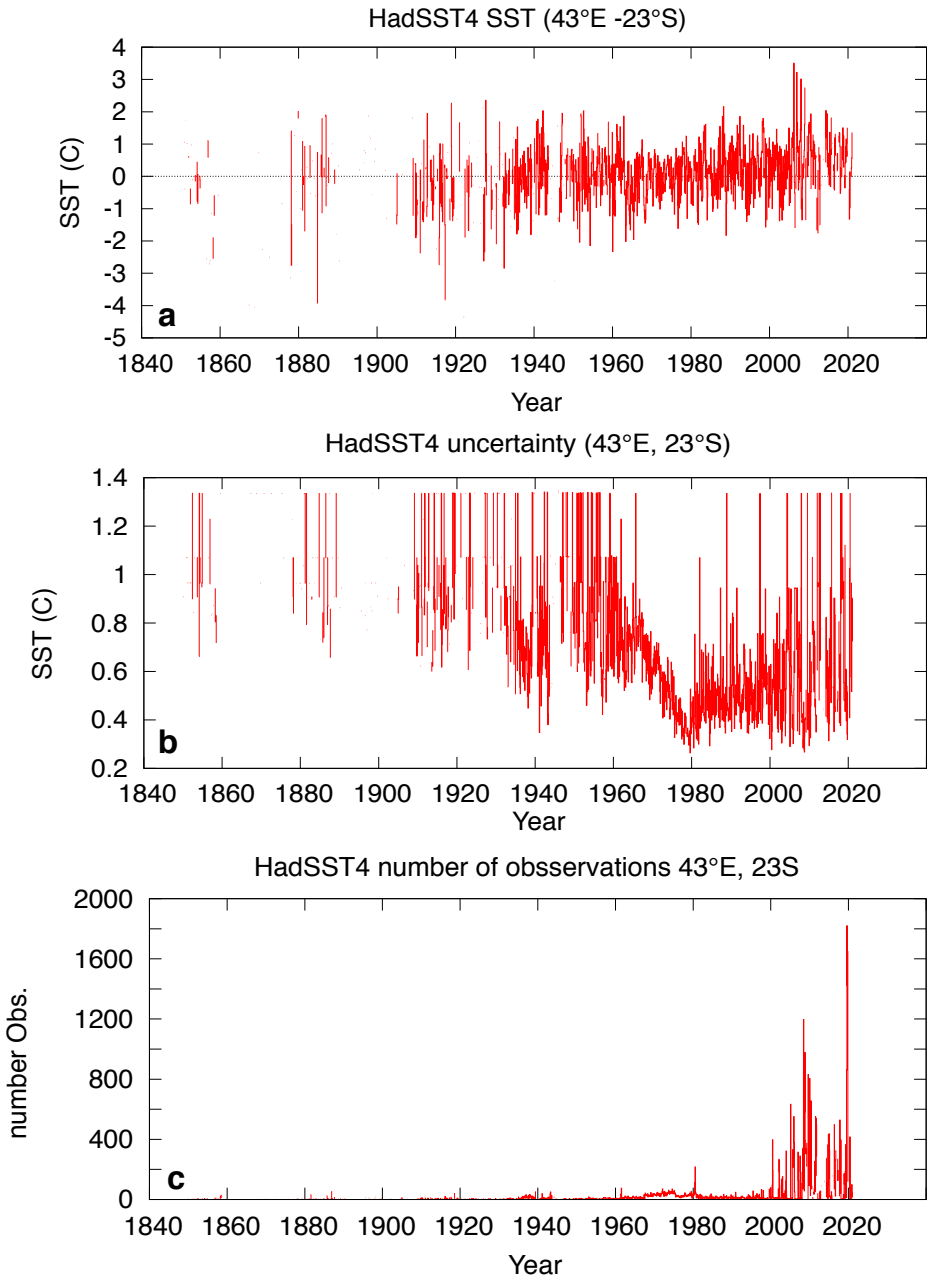

Figure S3 – HadSST4 data for the grid box of Ifaty-Tulear (43°E, 23°S). a) SST anomalies, b) uncertainty of SST and c) number of observations in SST.

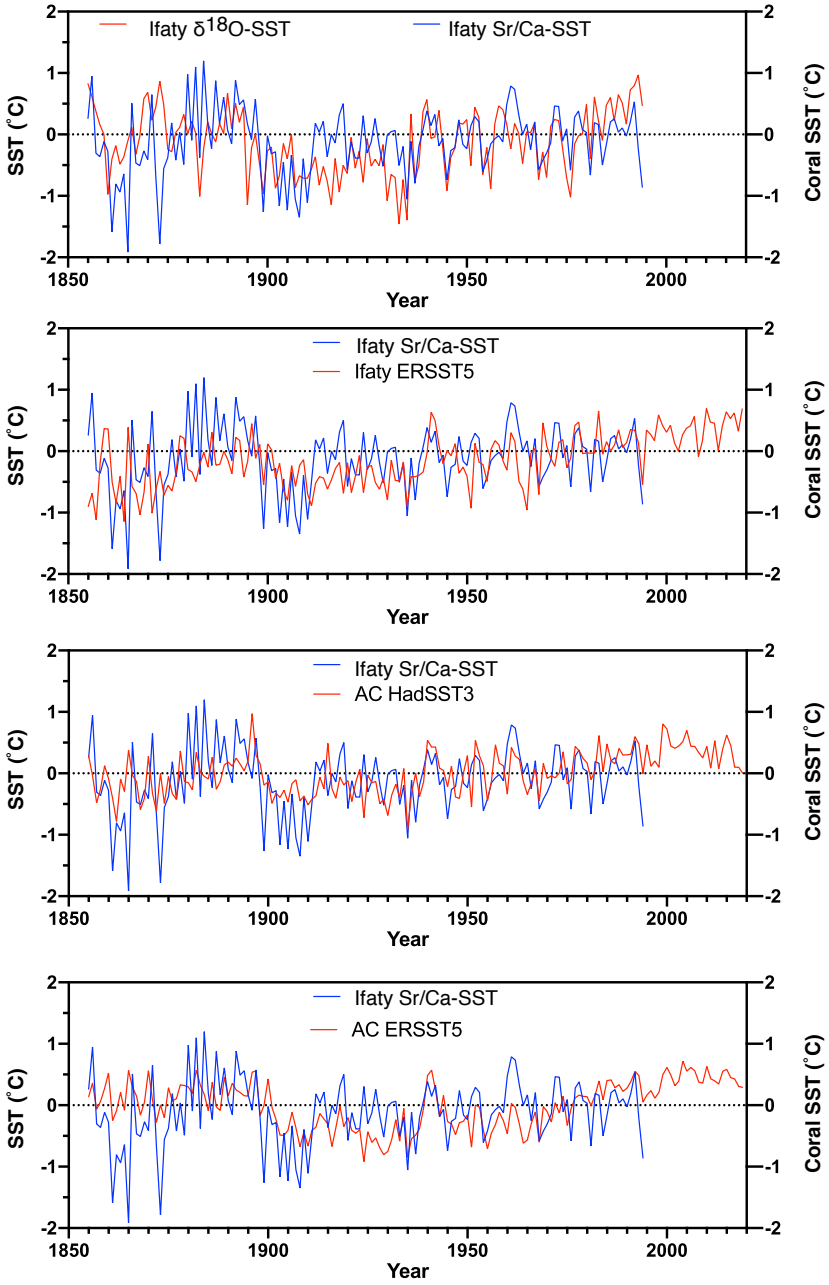

Figure S4 – Ifaty-Tulear Sr/Ca-SST annual anomaly reconstruction (blue) compared to a) δ^{18}O-SST (red), b) Ifaty-Tulear ERSST5 (red), c) Agulhas Current core region (AC) HadSST3 and d) Agulhas Current core region (AC) ERSST5.

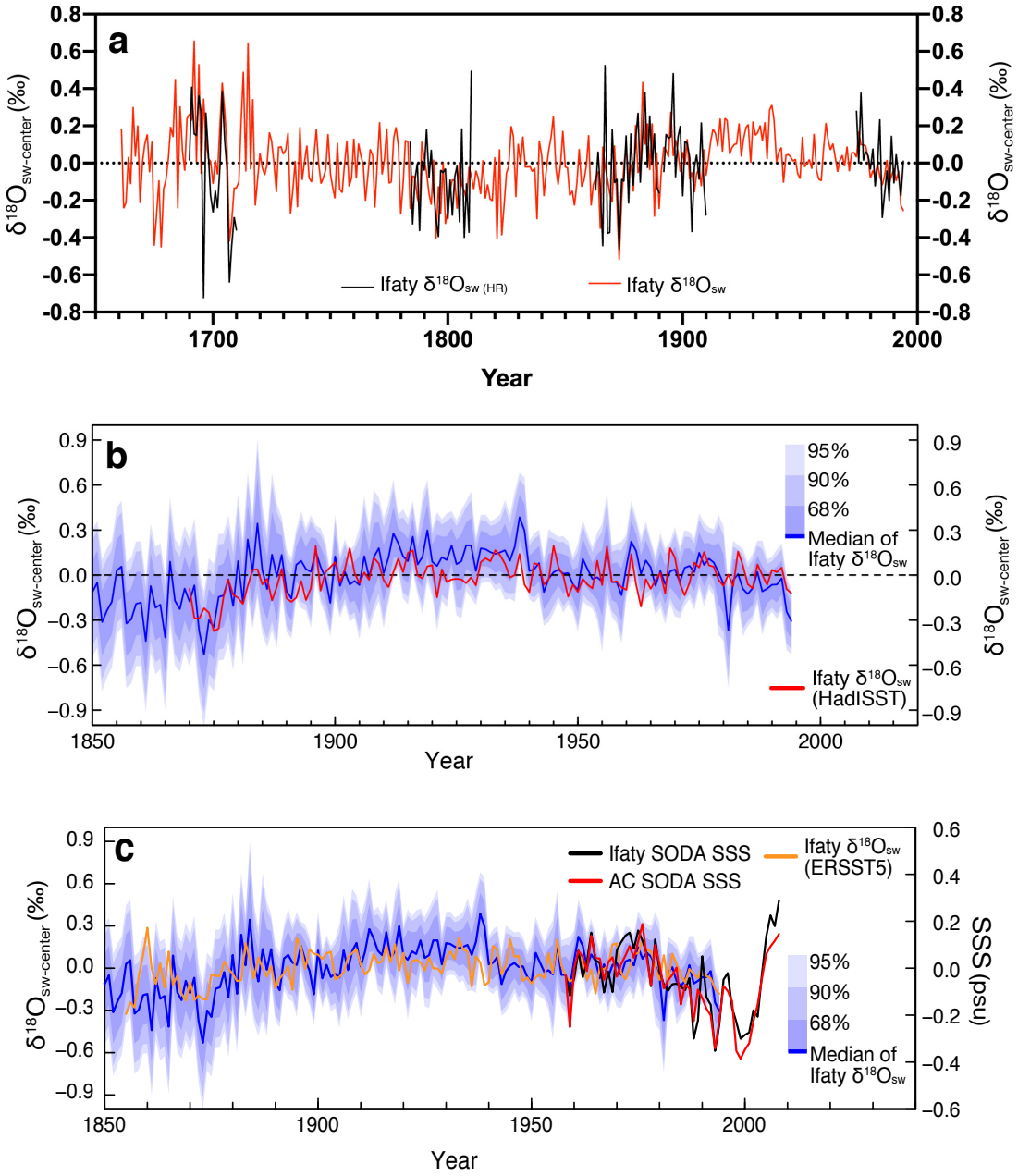

Figure S5 – a) Composite Ifaty-Tulear $\delta^{18}O_{seawater}$ anomaly reconstruction (red) based on annual composite Sr/Ca-SST compared to single core Ifaty-4 derived $\delta^{18}O_{seawater}$ (black) from bimonthly resolved decadal periods in Zinke et al. (2004). b) Composite Ifaty-Tulear $\delta^{18}O_{seawater}$ anomaly reconstruction (blue) based on annual Sr/Ca-SST compared to $\delta^{18}O_{seawater}$ derived from HadISST (red) instead of Sr/Ca-SST paired with coral $\delta^{18}O$. The correlation after linear detrending between both time series is r=0.51, p<0.001, N= 122. c) same as b but using Ifaty ERSST5 (orange). The correlation after linear detrending between both time series is r=0.45, p<0.001, N= 139.

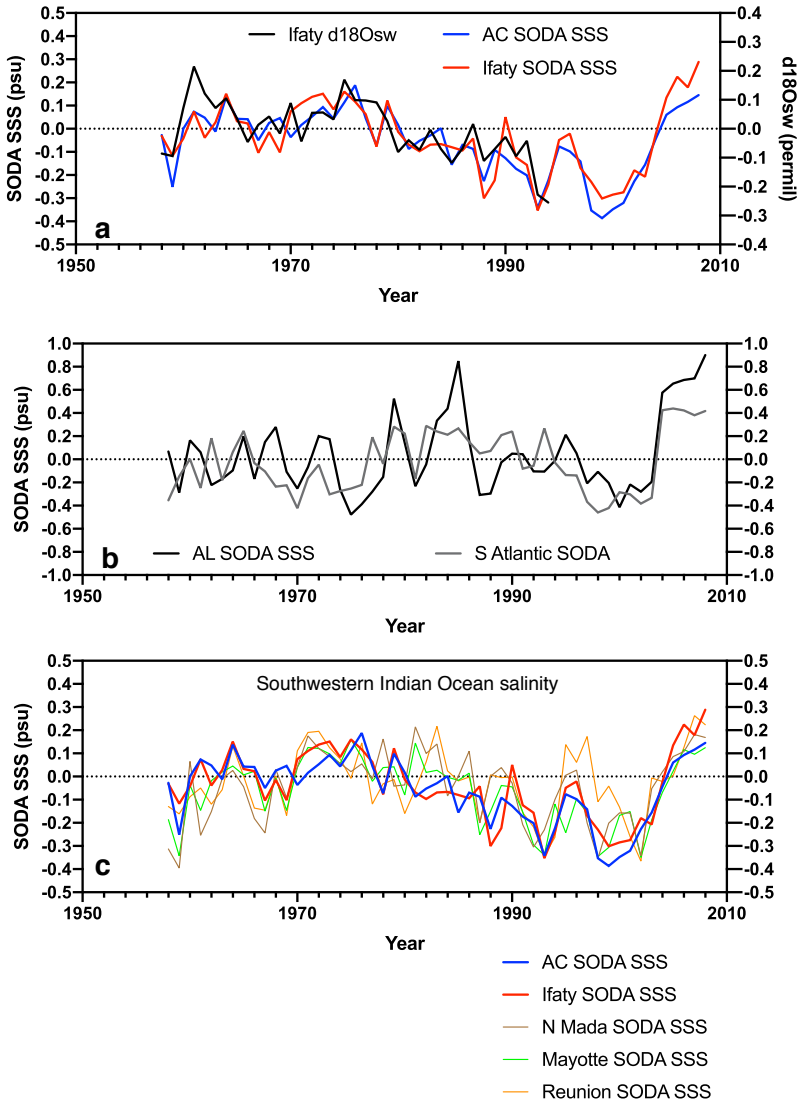

Figure S6 – a) Ifaty-Tulear $\delta^{18}O_{seawater}$ anomaly reconstruction (black) compared to Agulhas Current (blue) and Agulhas Leakage (red) regional salinity from SODA reanalysis. b) South Atlantic (grey) and Agulhas Leakage (black) regional salinity from SODA reanalysis. c) Southwestern Indian Ocean salinity records along the path of the South Equatorial Current show strong co-variability pointing to ocean horizontal advection as major driver of salinity anomalies.

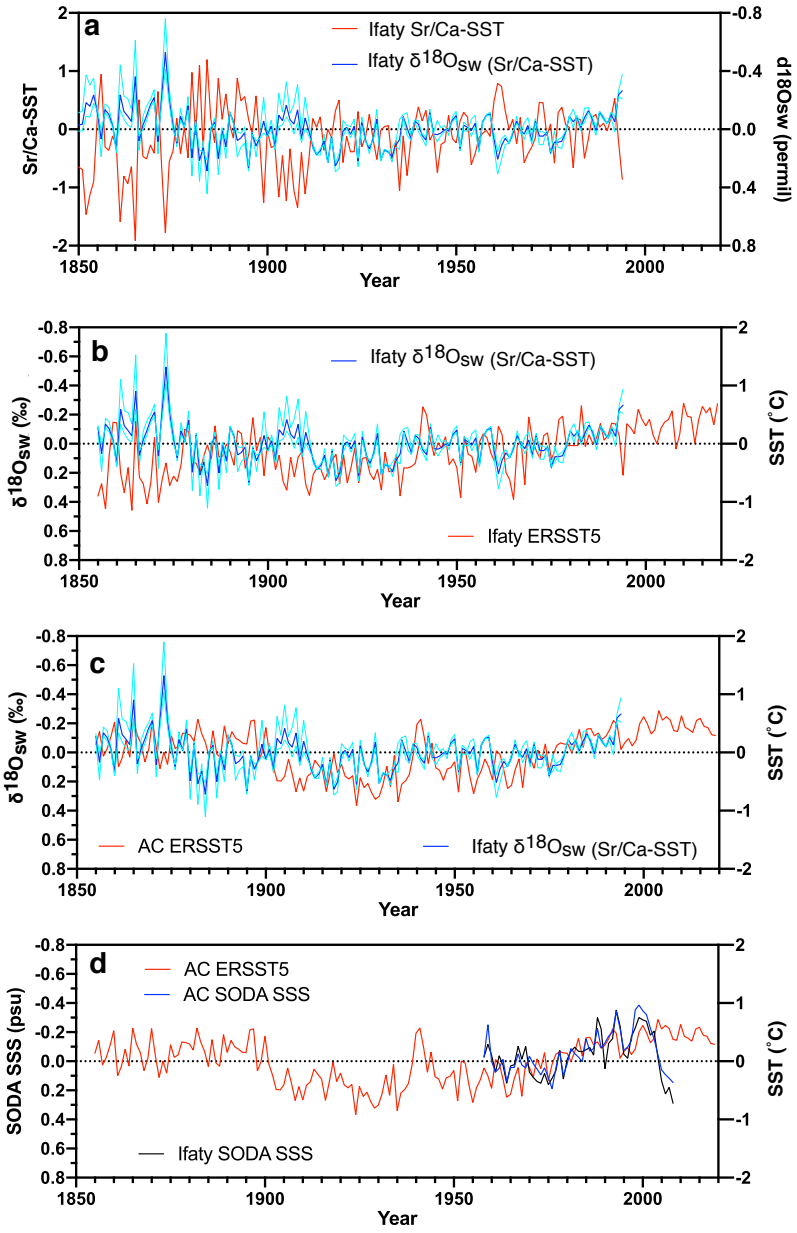

Figure S7 - Ifaty-Tulear $\delta^{18}O_{seawater}$ anomaly reconstruction (black; 95% confidence interval = light blue) compared to a) Ifaty-Tulear Sr/Ca-SST reconstruction, b) Ifaty-Tulear ERSST5 reconstruction, c) Agulhas Current core region (AC; red) ERSST5. d) Agulhas Current core region (AC; red) ERSST5 compared to salinity from SODA reanalysis for Ifaty (black) and Agulhas Current core region (AC; blue). Note the warming and freshening of surface waters since the 1970's.

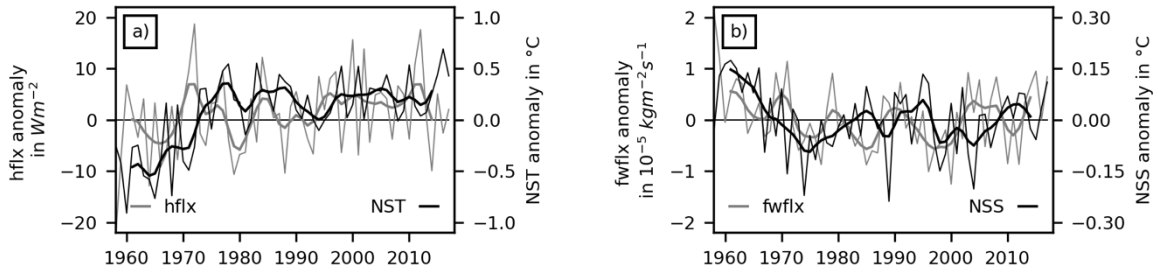

Figure S8 – Simulated annual mean (thin lines) and sub-decadally filtered (7-year Hamming filter) NST/NSS and surface flux anomalies (referenced to 1961-1990 mean, Figure 7) at IFA. (a) NST (schwarz) and surface heat flux (hflx, grey, positive downward). (b) NSS (black) and surface freshwater flux (fwflx, grey, positive upward). Annual means are calculated as March to February averages for better comparison with the coral record.

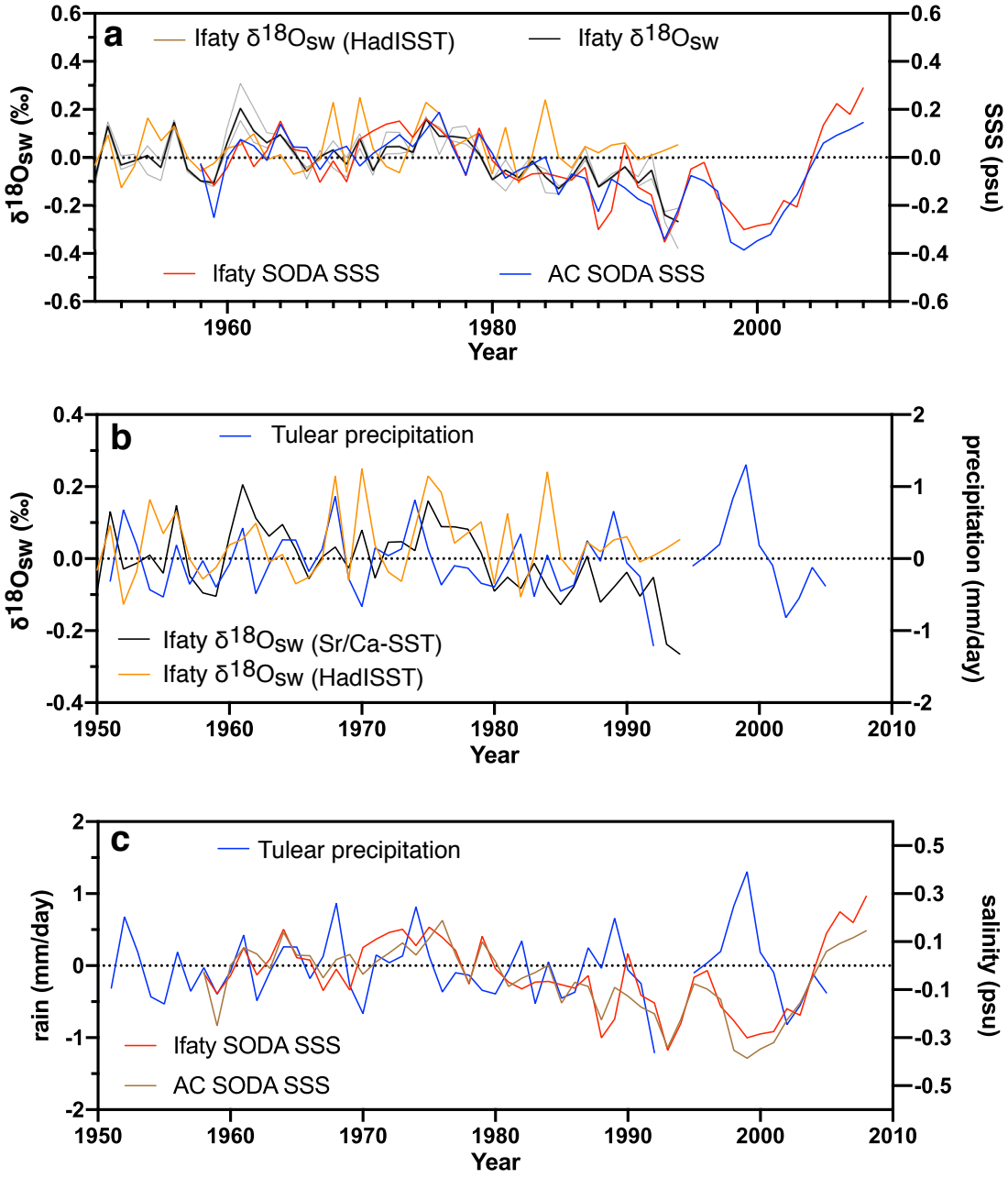

Figure S9 – a) Ifaty-Tulear $\delta^{18}O_{seawater}$ anomaly reconstruction (black; orange= $\delta^{18}O_{seawater}$ with HadISST) compared to salinity at Ifaty and the Agulhas current core region (AC). B) Same as a) yet with Tulear weather station rainfall data (blue) and c) Salinity at Ifaty (red) and the Agulhas current core region (AC; brown) compared with Tulear weather station rainfall data (blue).

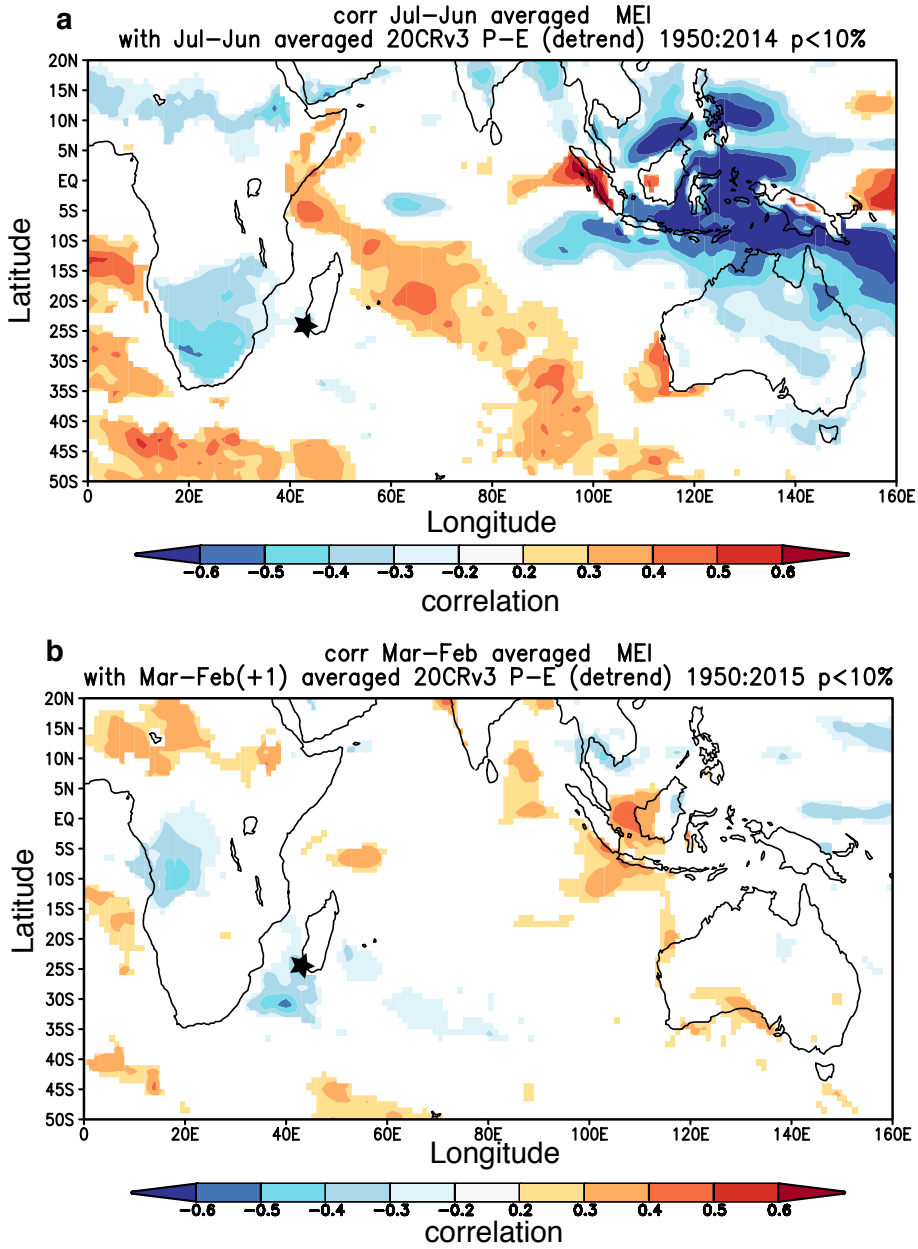

Figure S10 – Spatial correlation between the Multivariate ENSO index (MEI) and the precipitation-evaporation balance from 20th century reanalysis data. a) July to June average correlation and b) March to February with 12 month lag. Note the positive correlations across the southern Indian Ocean which indicates increased rainfall and surface water freshening in a and the negative correlation over Southern Africa (in a) and the Agulhas Current (a and b). The salinity anomalies east of Madagascar are advected into the Mozambique Channel and the South Madagascar Current eventually reaching the Agulhas Current (Grunsreich et al., 2011; Paris et al., 2018). Star marks Ifaty-Tulear coral reef location.

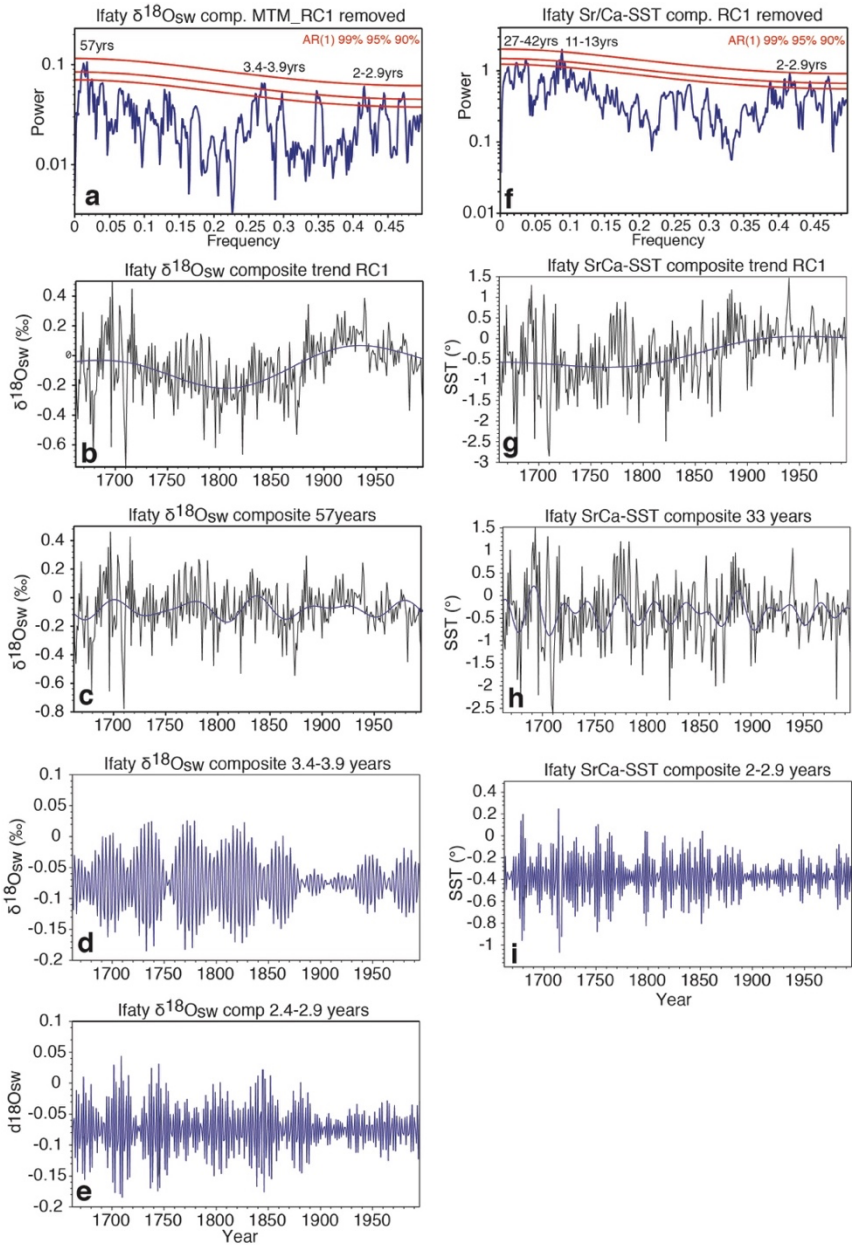

Figure S11 - Multitaper method spectral analysis (MTM; for detrended data; Torrence and Compo, 1998) and reconstructed components (RCs) of a-e) reconstructed Ifaty $\delta^{18}O_{seawater}$ composite and f-i) Ifaty Sr/Ca-SST composite. b and g) illustrate the long-term trends, c and h) the multidecadal frequencies and d, e, and i) the interannual frequencies. Significance levels for MTM spectra are indicated in a and f.

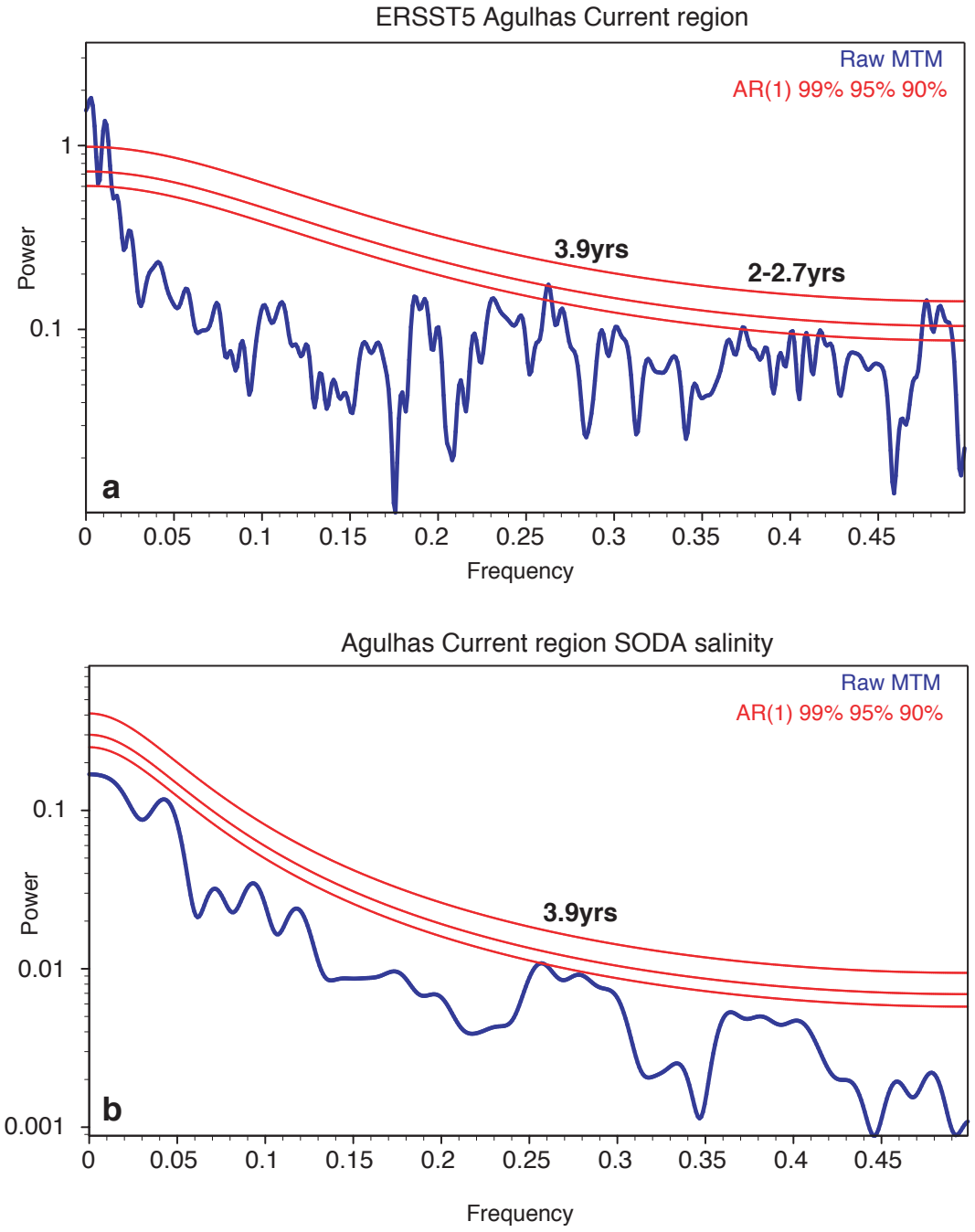

Figure S12 – Multitaper method spectral analysis of a) Agulhas Current region ERSST5 (1854-2020) and b) SODA salinity (1958-2008). Interannual frequencies >90% significance levels indicated.

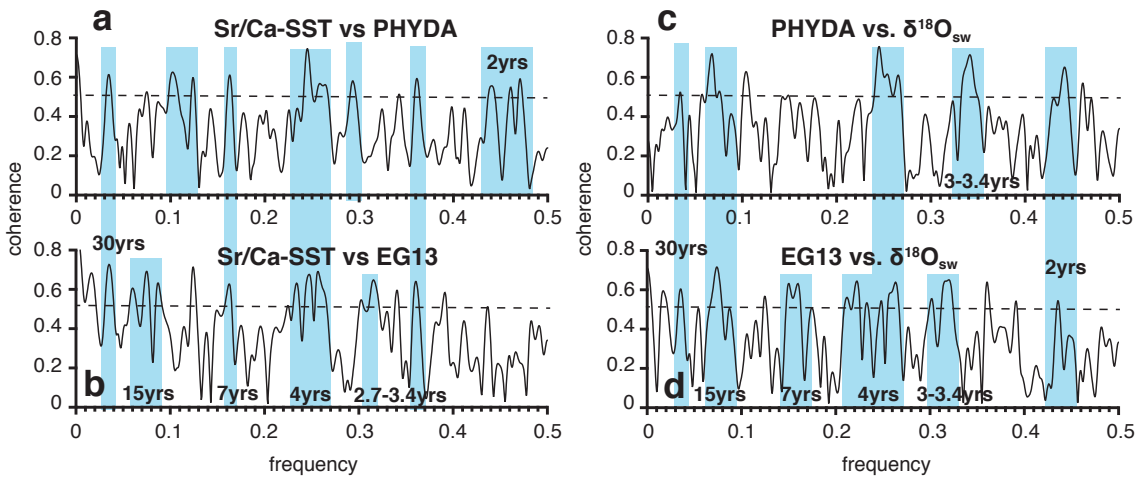

Figure S13 - Blackman-Tuckey spectral coherence between Ifaty-Tulear Sr/Ca-SST (a and b) and $\delta^{18}O_{seawater}$ composites (c and d) with Niño3.4 reconstructions of Steiger et al. (2018; PHYDA) and Emile-Geay et al. (2013; EG13) between 1661 and 1995. Coherent frequency bands above 90% significance level (dashed line) shaded in light blue.

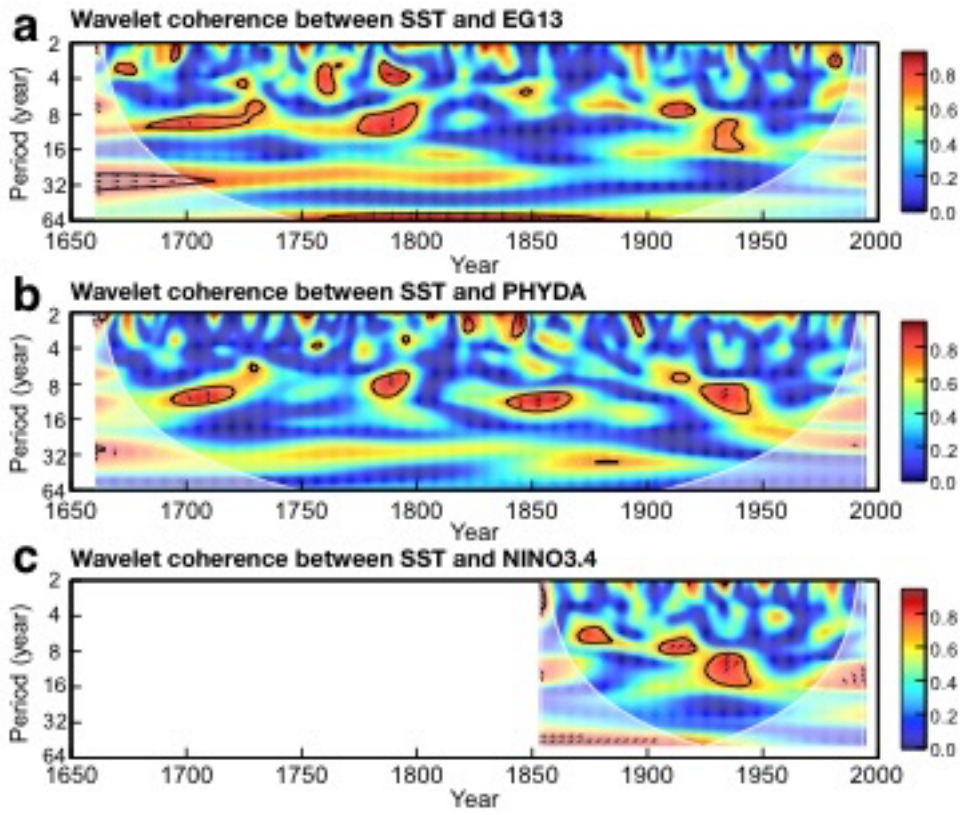

Figure S14 - Cross-wavelet coherence (Torrence and Compo, 1998) between Ifaty-Tulear Sr/Ca-SST composite with Niño3.4 reconstructions of a) Emile-Geay et al. (2013; EG13), b) Steiger et al. (2018; PHYDA) and c) observed Niño3.4 index based on ERSSTv5 between 1661 and 1995. Coherent frequency bands above 95% significance level encircled by black lines and filled red. Phase of coherence indicated by arrows.

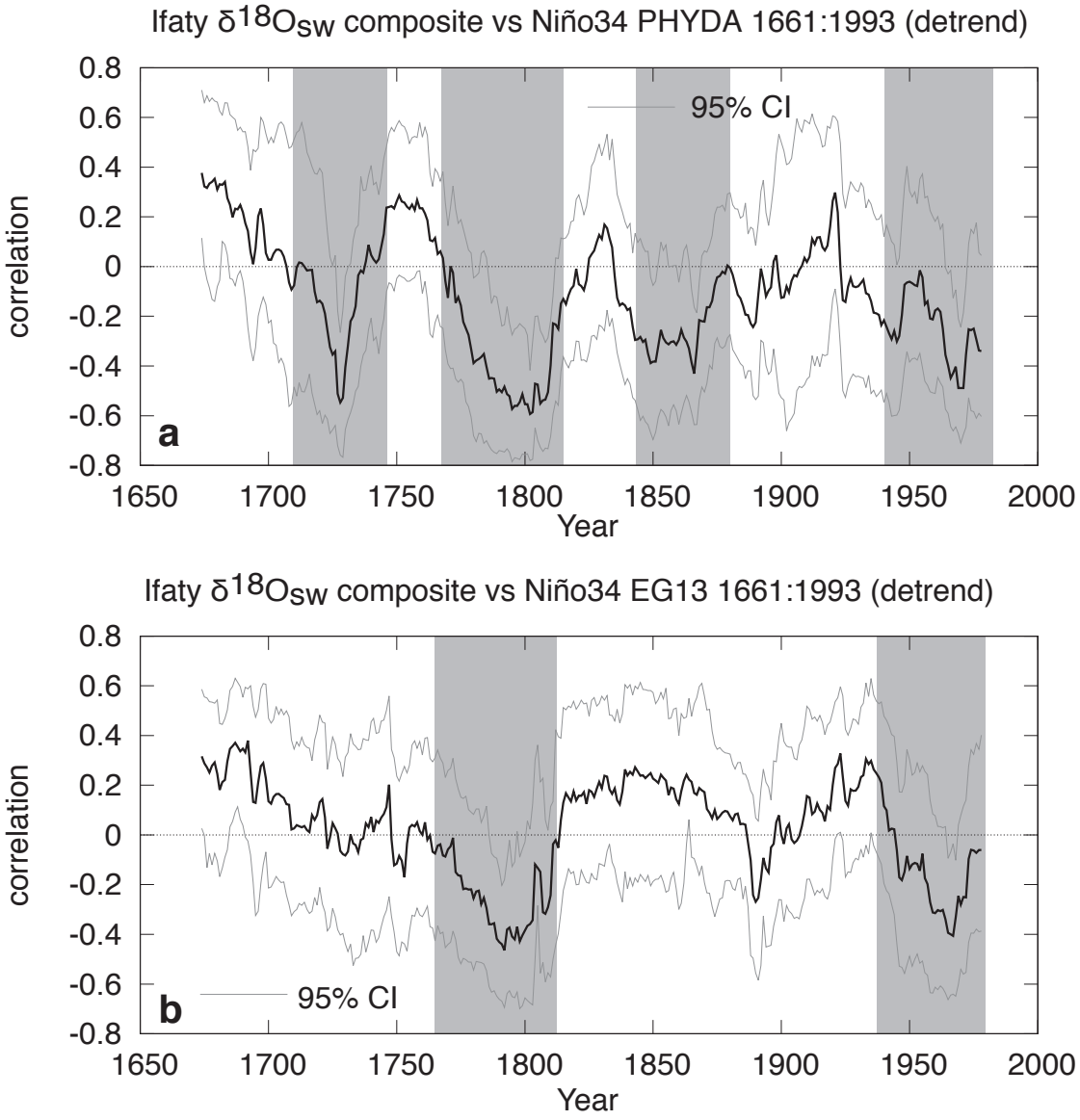

Figure S15 – 31-year running correlations (black line) between Ifaty-Tulear $\delta^{18}O_{seawater}$ composite and a) Niño3.4 reconstructions of Steiger et al. (2018; PHYDA), b) Nino3.4 reconstruction of Emile-Geay et al. (2013; EG13). Grey lines mark 95% confidence interval. Grey shaded bars highlight period of significant negative correlations. Overall, the relationships are highly non-stationary.

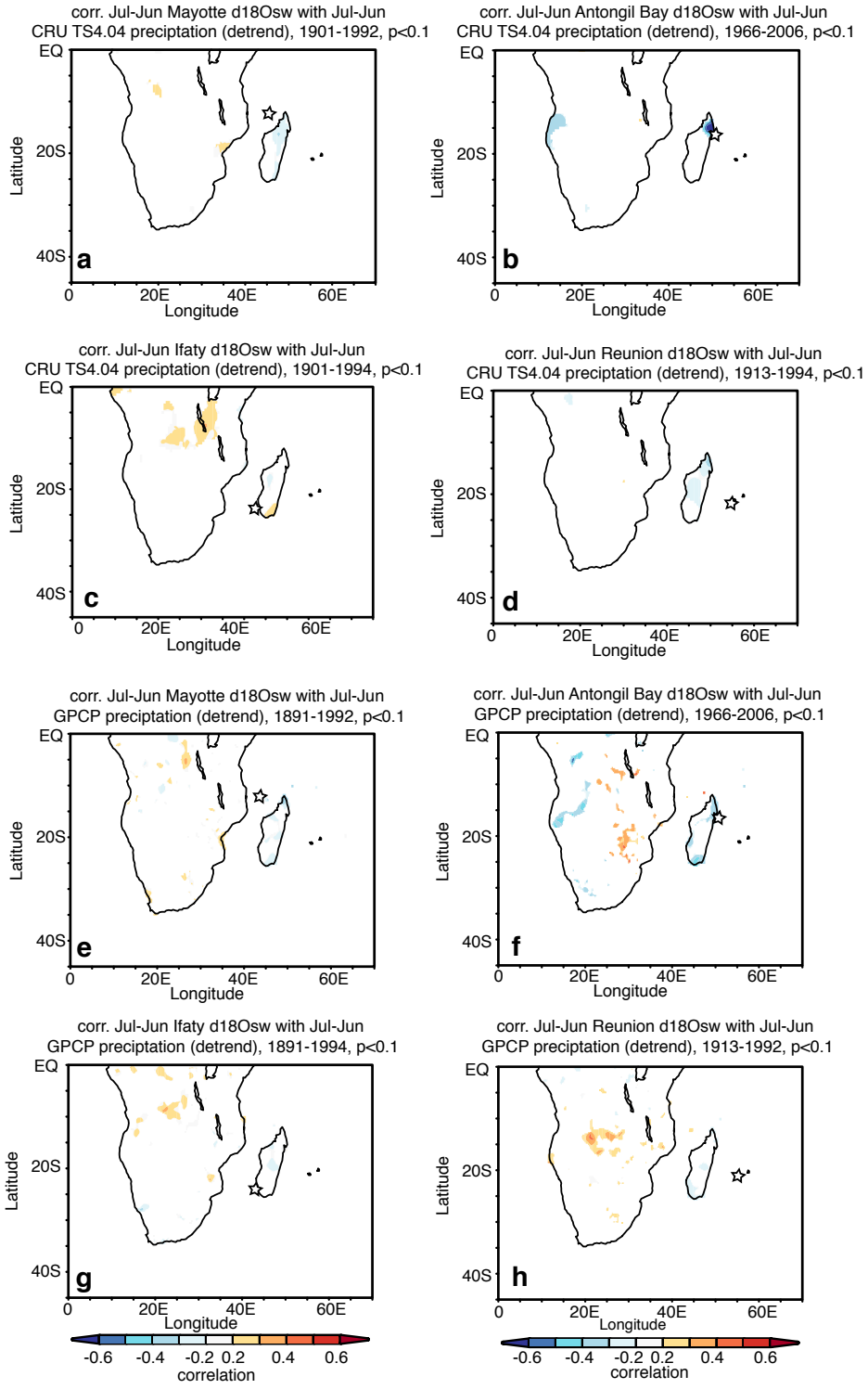

Figure S16 - Comparison of western Indian Ocean $\delta^{18}O_{seawater}$ reconstructions (star) with gridded rainfall data. a, e) Mayotte $\delta^{18}O_{seawater}$ (Comoro Archipelago; red; Zinke et al., 2008) b, f) Antongil Bay $\delta^{18}O_{seawater}$ (northeast Madagascar; Grove et al., 2012), d, h) La Reunion $\delta^{18}O_{seawater}$ (Pfeiffer et al., 2019) and c, g) Ifaty $\delta^{18}O_{seawater}$ (this study).

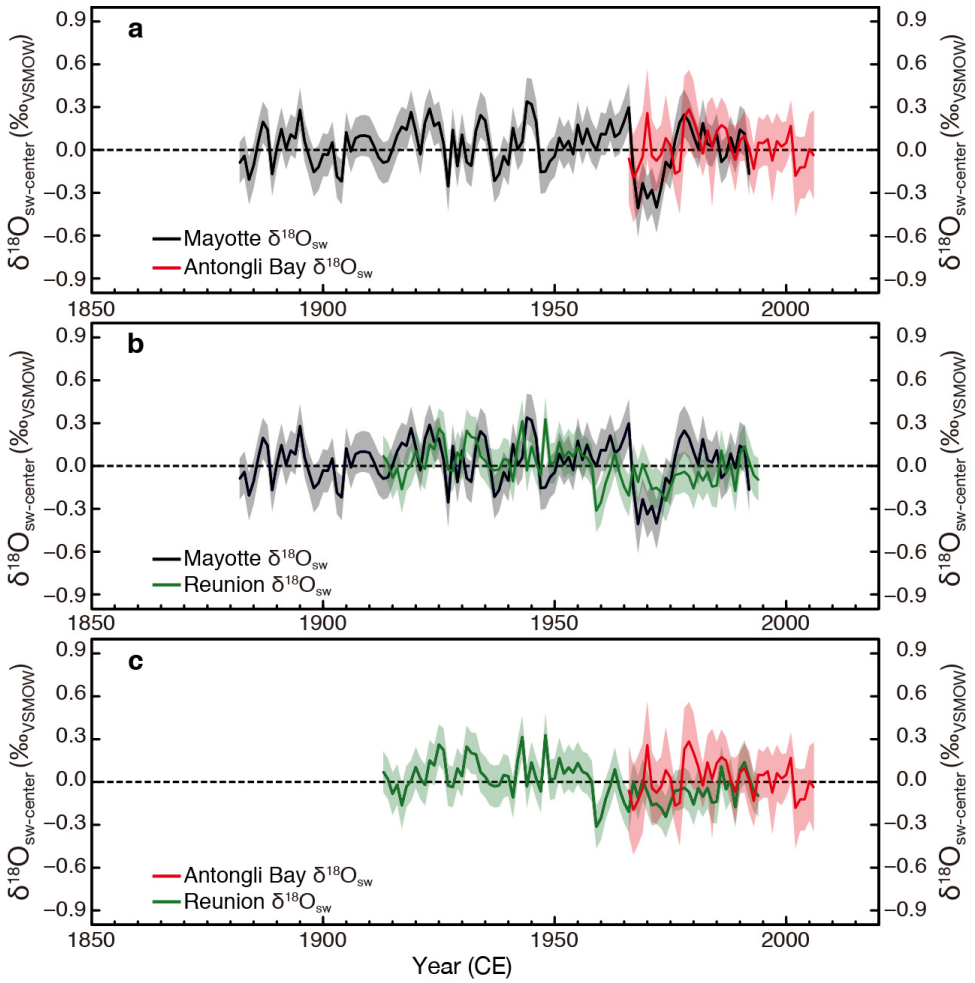

Figure S17 - Comparison of western Indian Ocean $\delta^{18}O_{seawater}$ reconstructions. A) reconstructed $\delta^{18}O_{seawater}$ for Antongil Bay (northeast Madagascar; Grove et al., 2012) with Mayotte (red; Comoro Archipelago; Zinke et al., 2008) with r=0.65, p=0.0038, N=26, b) reconstructed $\delta^{18}O_{seawater}$ for La Reunion (Pfeiffer et al., 2019) with Mayotte (Comoro Archipelago; red; Zinke et al., 2008) with no significant correlation, c) Antongil Bay (northeast Madagascar; Grove et al., 2012) with La Reunion (Pfeiffer et al., 2019) with no significant correlation.

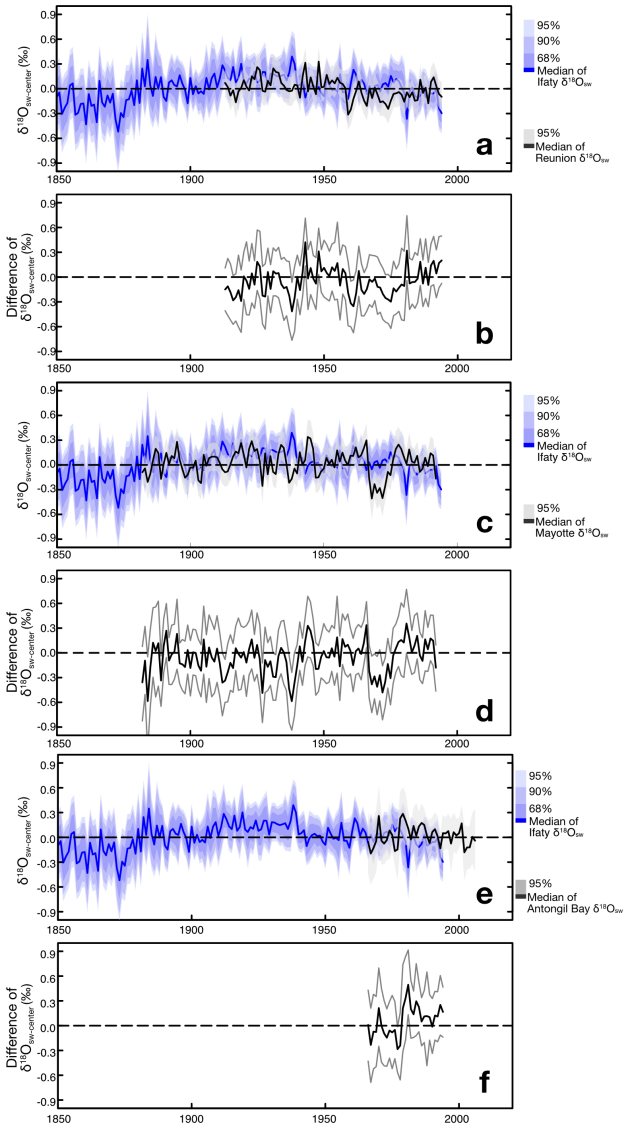

Figure S18 - Comparison of western Indian Ocean $\delta^{18}O_{seawater}$ reconstructions and their absolute differences with Ifaty-Tulear $\delta^{18}O_{seawater}$. Reconstructed $\delta^{18}O_{seawater}$ for Ifaty-Tulear (this study) compared with a-b) $\delta^{18}O_{seawater}$ for La Reunion (Pfeiffer et al., 2019), c-d) $\delta^{18}O_{seawater}$ for Mayotte (red; Comoro Archipelago; Zinke et al., 2008), e-f) $\delta^{18}O_{seawater}$ for Antongil Bay (northeast Madagascar; Grove et al., 2012). The absolute differences of $\delta^{18}O_{seawater}$ (black lines in b, d, and f) between Ifaty-Tulear and other western Indian Oceans (b: La Reunion; d: Mayotte; f: Antongil Bay) were estimated using the Monte-Carlo approach by considering the uncertainties of $\delta^{18}O_{seawater}$. Gray lines show its 95% confidence interval. Dot lines are zero values, which are within the 95% confidence level in most years. This analysis reveals that the absolute difference is smaller than the individual uncertainties, thus the $\delta^{18}O_{seawater}$ ranges for all western Indian Ocean sites fully overlap and are indistinguishable.

Tables

Table S1 – Sequence of analytical data acquisition for the Ifaty and Tulear coral core samples. In this study we combined new annual Sr/Ca data from three cores with previously measured time series of Sr/Ca and $\delta^{18}O$ to reconstruct $\delta^{18}O_{seawater}$ at annual resolution**.**

Cores	**Zinke et al. (2004)**	**Zinke et al. (2014)**	**This study**
Ifaty-4	Monthly $\delta^{18}O$ 1920-1995, Bimonthly $\delta^{18}O$ 1919-1658 Monthly Sr/Ca 1973-1995; 1863-1910; 1784-1809; 1688-1710	-	Annual Sr/Ca Ifaty-4: 1911-1973; 1810-1862; 1711-1783; 1661-1687 Composite* Annual Sr/Ca Ifaty-4: 1661-1995
Ifaty-1		Annual $\delta^{18}O$ Ifaty-1: 1892-1995	Annual Sr/Ca Ifaty-1: 1892-1995
Tulear-3		Annual $\delta^{18}O$ Tulear-3: 1910-1995	Annual Sr/Ca Tulear-3: 1910-1995

*including annually averaged monthly Sr/Ca from Zinke et al., 2004.

Table S2 - Correlations of detrended, annual reconstructed SST (IF comp= Ifaty/Tulearcoral composite SST) with annual mean (March to February) SST of instrumental records at Ifaty (IF) and within the Agulhas Current (AC) core region between 1958 and 1995. HadISST (Rayner et al., 2003), Had3= HadSST3 (Kennedy et al., 2011), ERSST= ERSST5 (Huang et al., 2016). All correlations between instrumental data and IF $\delta^{18}O$ composite and IF Sr/Ca composite with instrumental data were significant at 5% level. Correlations taking into account the degrees of freedom for each correlation pair. Correlations computed at http://climexp.knmi.nl/ (Trouet and Oldenborgh, 2013).

	IF $\delta^{18}O$ comp	IF Sr/Ca comp	IF HadISST	IF Had3	IF ERSST	AC Had1	AC Had3	AC ERSST
IF $\delta^{18}O$ comp	1							
IF Sr/Ca comp	0.33	1						
IF HadISST	0.50	0.27	1					
IF Had3	0.34	0.43	0.83	1				
IF ERSST	0.37	0.30	0.81	0.83	1			
AC HadISST	0.58	0.38	0.73	0.46	0.57	1		
AC Had3	0.47	0.35	0.64	0.46	0.60	0.79	1	
AC ERSST	0.54	0.34	0.68	0.51	0.56	0.84	0.87	1

Table S3 – Correlation matrix between annual mean salinity from SODA 2.1.6 and Had EN4.2.1 for tropical and subtropical Indian Ocean sites between 1958 and 2010. Note the lack of significant correlation for the subtropical southwestern Indian Ocean sites.

Site	Coordinates	correlation	p-value
Seychelles	4°S, 54°E	0.44	0.001
Chagos	5°S, 71°E	0.46	0.0006
Cocos Keeling	12°S, 96°E	0.39	0.01
Ningaloo	21°S, 113°E	0.40	0.007
Mayotte	13°S, 45°E	0.31	0.027
N Madagascar	15°S, 50°E	0.24	0.15
Reunion	21°S, 54°E	0.22	0.19
Ifaty	23°S, 43°E	0.13	0.42
Agulhas Current	32°S, 32°E	-0.17	0.26

Table S4 – Raw data of coral Sr/Ca ratios (mmol/mol) and oxygen isotopes ($\delta^{18}O$; ‰) from Ifaty and Tulear corals used for the reconstruction of $\delta^{18}O_{seawater}$.

year	Ifaty-1 Sr/Ca	Ifaty-1 $\delta^{18}O$	Ifaty-4 Sr/Ca	Ifaty-4 $\delta^{18}O$	Tulear-3 Sr/Ca	Tulear-3 $\delta^{18}O$
1994	8.81	-4.79	8.89	-4.49	8.98	-4.64
1993	8.74	-4.70	8.89	-4.53	8.93	-4.92
1992	8.67	-4.78	8.82	-4.48	8.94	-4.71
1991	8.69	-4.77	8.86	-4.42	8.94	-4.69
1990	8.72	-4.64	8.85	-4.45	8.96	-4.64
1989	8.70	-4.70	8.84	-4.48	8.96	-4.72
1988	8.65	-4.68	8.89	-4.46	8.98	-4.76
1987	8.73	-4.73	8.84	-4.41	8.91	-4.53
1986	8.69	-4.73	8.84	-4.45	8.96	-4.77
1985	8.76	-4.76	8.87	-4.43	8.93	-4.64
1984	8.84	-4.46	8.84	-4.53	8.93	-4.53
1983	8.75	-4.63	8.84	-4.43	8.91	-4.58
1982	8.70	-4.74	8.86	-4.30	8.93	-4.75
1981	8.92	-4.43	8.88	-4.46	9.07	-4.54
1980	8.66	-4.94	8.87	-4.32	8.99	-4.50
1979	8.84	-4.61	8.82	-4.35	8.85	-4.62
1978	8.75	-4.67	8.81	-4.38	8.90	-4.52
1977	8.69	-4.48	8.82	-4.38	8.96	-4.55
1976	8.81	-4.16	8.83	-4.38	8.98	-4.42
1975	8.71	-4.22	8.85	-4.41	8.95	-4.54
1974	8.80	-4.49	8.82	-4.40	8.92	-4.54
1973	8.73	-4.75	8.80	-4.31	8.91	-4.62
1972	8.68	-4.72	8.86	-4.39	8.89	-4.62
1971	8.77	-4.69	8.80	-4.35	8.97	-4.55
1970	8.70	-4.39	8.84	-4.41	9.04	-4.45
1969	8.79	-4.39	8.85	-4.27	8.96	-4.56
1968	8.75	-4.38	8.86	-4.49	9.03	-4.50
1967	8.73	-4.45	8.86	-4.45	8.90	-4.71
1966	8.75	-4.46	8.85	-4.48	8.96	-4.66
1965	8.73	-4.48	8.82	-4.43	8.95	-4.61
1964	8.72	-4.56	8.82	-4.42	8.99	-4.30
1963	8.70	-4.68	8.82	-4.61	8.95	-4.47
1962	8.67	-4.52	8.82	-4.50	8.91	-4.55
1961	8.74	-4.41	8.77	-4.54	8.87	-4.47
1960	8.72	-4.48	8.80	-4.56	8.92	-4.67
1959	8.66	-4.63	8.89	-4.66	9.00	-4.59
1958	8.71	-4.68	8.81	-4.54	9.01	-4.48
1957	8.70	-4.47	8.86	-4.52	8.98	-4.67
1956	8.74	-3.98	8.87	-4.46	8.94	-4.48

1955	8.68	-4.59	8.83	-4.49	9.09	-4.36
1954	8.73	-4.21	8.89	-4.46	9.02	-4.52
1953	8.69	-4.61	8.84	-4.56	8.95	-4.61
1952	8.73	-4.46	8.83	-4.39	8.91	-4.80
1951	8.69	-4.48	8.80	-4.42	9.01	-4.44
1950	8.68	-4.68	8.90	-4.49	8.99	-4.53
1949	8.76	-4.64	8.83	-4.44	8.96	-4.55
1948	8.70	-4.61	8.86	-4.47	8.92	-4.60
1947	8.80	-4.37	8.84	-4.44	8.93	-4.59
1946	8.71	-4.43	8.87	-4.35	8.99	-4.49
1945	8.73	-4.34	8.92	-4.33	9.01	-4.34
1944	8.67	-4.64	8.88	-4.52	8.98	-4.42
1943	8.73	-4.76	8.87	-4.51	8.96	-4.50
1942	8.69	-4.46	8.82	-4.54	8.96	-4.54
1941	8.71	-4.59	8.83	-4.56	8.95	-4.40
1940	8.68	-4.69	8.81	-4.52	8.93	-4.61
1939	8.63	-4.50	8.83	-4.44	8.80	-4.70
1938	8.66	-4.51	8.85	-4.22	8.84	-4.35
1937	8.64	-4.59	8.89	-4.52	8.89	-4.31
1936	8.65	-4.61	8.84	-4.33	8.97	-4.57
1935	8.70	-4.33	8.90	-4.41	8.99	-4.08
1934	8.70	-4.26	8.87	-4.25	8.99	-4.47
1933	8.76	-4.31	8.86	-4.35	9.00	-4.15
1932	8.71	-4.42	8.85	-4.37	8.96	-4.35
1931	8.69	-4.43	8.85	-4.26	8.98	-4.39
1930	8.76	-4.37	8.84	-4.40	8.93	-4.26
1929	8.76	-4.43	8.88	-4.31	8.92	-4.60
1928	8.70	-4.35	8.90	-4.32	8.84	-4.62
1927	8.67	-4.61	8.88	-4.34	8.89	-4.36
1926	8.66	-4.43	8.93	-4.49	8.92	-4.44
1925	8.69	-4.57	8.92	-4.39	8.90	-4.45
1924	8.69	-4.37	8.85	-4.39	8.94	-4.36
1923	8.72	-4.42	8.90	-4.39	8.87	-4.58
1922	8.71	-4.36	8.91	-4.36	8.92	-4.43
1921	8.65	-4.55	8.94	-4.46	8.88	-4.61
1920	8.74	-4.28	8.90	-4.28	8.96	-4.44
1919	8.65	-4.38	8.87	-4.07	8.90	-4.62
1918	8.62	-4.42	8.92	-4.46	8.95	-4.45
1917	8.75	-4.33	8.84	-4.41	8.96	-4.52
1916	8.76	-4.29	8.84	-4.33	8.92	-4.18
1915	8.79	-4.18	8.86	-4.24	8.94	-4.62
1914	8.66	-4.60	8.88	-4.36	8.95	-4.35
1913	8.72	-4.38	8.86	-4.27	8.94	-4.31

1912	8.74	-4.44	8.81	-4.18	8.82	-4.64
1911	8.75	-4.47	8.89	-4.32	8.84	-4.58
1910	8.77	-4.32	8.94	-4.48	8.88	-4.49
1909	8.79	-4.37	8.83	-4.52	8.87	-4.24
1908	8.81	-4.43	8.93	-4.30	8.85	-4.21
1907	8.77	-4.33	8.93	-4.56	8.91	-4.41
1906	8.79	-4.61	8.83	-4.47	8.82	-4.39
1905	8.79	-4.32	8.93	-4.55	8.89	-4.56
1904	8.76	-4.38	8.88	-4.48		
1903	8.78	-4.34	8.93	-4.26		
1902	8.75	-4.39	8.86	-4.43		
1901	8.74	-4.51	8.87	-4.48		
1900	8.78	-4.50	8.80	-4.23		
1899	8.81	-4.42	8.92	-4.38		
1898	8.76	-4.41	8.84	-4.52		
1897	8.68	-4.55	8.83	-4.58		
1896	8.75	-4.39	8.83	-4.25		
1895	8.72	-4.33	8.84	-4.69		
1894	8.68	-4.52	8.83	-4.64		
1893	8.66	-4.49	8.86	-4.52		
1892	8.66	-4.74	8.81	-4.50		
1891	8.75	-4.53	8.84	-4.70		
1890	8.69	-4.66	8.87	-4.57		
1889	8.68	-4.47	8.82	-4.52		
1888	8.64	-4.57	8.92	-4.52		
1887	8.60	-4.47	8.87	-4.63		
1886	8.71	-4.42	8.90	-4.65		
1885	8.65	-4.49	8.90	-4.52		
1884	8.57	-4.43	8.86	-4.40		
1883	8.74	-4.22	8.88	-4.56		
1882	8.60	-4.48	8.84	-4.52		
1881			8.84	-4.58		
1880			8.78	-4.54		
1879			8.87	-4.52		
1878			8.84	-4.46		
1877			8.86	-4.47		
1876			8.83	-4.61		
1875			8.86	-4.69		
1874			8.87	-4.60		
1873			8.94	-4.56		
1872			8.88	-4.65		
1871			8.80	-4.63		
1870			8.86	-4.51		

1869			8.85	-4.45		
1868			8.87	-4.54		
1867			8.87	-4.49		
1866			8.81	-4.44		
1865			8.95	-4.42		
1864			8.88	-4.48		
1863			8.89	-4.44		
1862			8.89	-4.32		
1861			8.93	-4.52		
1860			8.85	-4.55		
1859			8.84	-4.59		
1858			8.86	-4.64		
1857			8.86	-4.68		
1856			8.78	-4.57		
1855			8.82	-4.45		
1854			8.89	-4.41		
1853			8.91	-4.41		
1852			8.93	-4.42		
1851			8.88	-4.32		
1850			8.88	-4.39		
1849			8.85	-4.45		
1848			8.88	-4.29		
1847			8.90	-4.33		
1846			8.92	-4.44		
1845			8.82	-4.50		
1844			8.82	-4.52		
1843			8.83	-4.54		
1842			8.85	-4.43		
1841			8.89	-4.42		
1840			8.86	-4.61		
1839			8.83	-4.42		
1838			8.90	-4.44		
1837			8.88	-4.24		
1836			8.88	-4.41		
1835			8.93	-4.52		
1834			8.88	-4.42		
1833			8.85	-4.38		
1832			8.83	-4.38		
1831			8.88	-4.53		
1830			8.85	-4.32		
1829			8.89	-4.41		
1828			8.86	-4.43		
1827			8.81	-4.55		

1826			8.87	-4.54		
1825			8.85	-4.55		
1824			8.90	-4.41		
1823			8.95	-4.43		
1822			8.85	-4.46		
1821			8.99	-4.54		
1820			8.85	-4.51		
1819			8.89	-4.45		
1818			8.90	-4.43		
1817			8.89	-4.47		
1816			8.92	-4.50		
1815			8.85	-4.45		
1814			8.89	-4.50		
1813			8.88	-4.55		
1812			8.86	-4.61		
1811			8.87	-4.60		
1810			8.83	-4.74		
1809			8.82	-4.64		
1808			8.83	-4.45		
1807			8.85	-4.54		
1806			8.90	-4.54		
1805			8.83	-4.50		
1804			8.91	-4.49		
1803			8.87	-4.45		
1802			8.88	-4.55		
1801			8.91	-4.56		
1800			8.91	-4.49		
1799			8.92	-4.63		
1798			8.85	-4.60		
1797			8.89	-4.52		
1796			8.85	-4.40		
1795			8.96	-4.59		
1794			8.87	-4.52		
1793			8.89	-4.51		
1792			8.89	-4.53		
1791			8.86	-4.52		
1790			8.83	-4.47		
1789			8.81	-4.42		
1788			8.92	-4.39		
1787			8.93	-4.45		
1786			8.90	-4.40		
1785			8.88	-4.43		
1784			8.95	-4.58		

1783			8.83	-4.65		
1782			8.78	-4.52		
1781			8.83	-4.30		
1780			8.92	-4.34		
1779			8.88	-4.53		
1778			8.84	-4.49		
1777			8.80	-4.55		
1776			8.88	-4.52		
1775			8.86	-4.56		
1774			8.78	-4.51		
1773			8.82	-4.42		
1772			8.86	-4.62		
1771			8.80	-4.66		
1770			8.81	-4.61		
1769			8.87	-4.52		
1768			8.80	-4.40		
1767			8.82	-4.40		
1766			8.89	-4.39		
1765			8.94	-4.32		
1764			8.88	-4.38		
1763			8.89	-4.45		
1762			8.85	-4.27		
1761			8.88	-4.27		
1760			8.87	-4.47		
1759			8.94	-4.41		
1758			8.89	-4.39		
1757			8.84	-4.34		
1756			8.88	-4.46		
1755			8.94	-4.44		
1754			8.90	-4.42		
1753			8.83	-4.61		
1752			8.93	-4.37		
1751			8.85	-4.35		
1750			8.90	-4.44		
1749			8.85	-4.40		
1748			8.87	-4.41		
1747			8.90	-4.38		
1746			8.90	-4.23		
1745			8.88	-4.33		
1744			8.87	-4.44		
1743			8.89	-4.40		
1742			8.89	-4.36		
1741			8.90	-4.41		

1740			8.86	-4.39		
1739			8.87	-4.40		
1738			8.91	-4.43		
1737			8.82	-4.43		
1736			8.94	-4.48		
1735			8.86	-4.52		
1734			8.90	-4.13		
1733			8.92	-4.30		
1732			8.91	-4.33		
1731			8.88	-4.19		
1730			8.88	-4.31		
1729			8.91	-4.36		
1728			8.88	-4.27		
1727			8.94	-4.14		
1726			8.91	-4.30		
1725			8.92	-4.47		
1724			8.86	-4.47		
1723			8.86	-4.41		
1722			8.87	-4.42		
1721			8.88	-4.38		
1720			8.85	-4.41		
1719			8.91	-4.10		
1718			8.94	-4.20		
1717			8.86	-4.05		
1716			8.94	-4.35		
1715			8.79	-4.16		
1714			8.90	-4.23		
1713			8.80	-4.42		
1712			8.86	-4.32		
1711			8.90	-4.08		
1710			8.94	-4.30		
1709			9.01	-4.55		
1708			9.00	-4.31		
1707			8.96	-4.32		
1706			8.87	-4.31		
1705			8.82	-4.39		
1704			8.77	-4.39		
1703			8.82	-4.17		
1702			8.90	-4.35		
1701			8.94	-4.24		
1700			8.92	-4.20		
1699			8.92	-4.25		
1698			8.93	-4.33		

1697			8.88	-4.09		
1696			8.79	-4.09		
1695			8.99	-4.50		
1694			8.81	-4.13		
1693			8.84	-4.37		
1692			8.76	-4.46		
1691			8.82	-4.43		
1690			8.78	-4.41		
1689			8.80	-4.38		
1688			8.89	-4.22		
1687			8.86	-4.49		
1686			8.84	-4.16		
1685			8.92	-4.21		
1684			8.81	-4.39		
1683			8.89	-4.37		
1682			8.82	-4.44		
1681			8.88	-4.51		
1680			8.89	-4.49		
1679			8.89	-4.52		
1678			8.98	-4.52		
1677			8.87	-4.55		
1676			8.93	-4.34		
1675			8.96	-4.43		
1674			8.86	-4.30		
1673			8.88	-4.36		
1672			8.86	-4.43		
1671			8.86	-4.66		
1670			8.86	-4.49		
1669			8.86	-4.45		
1668			8.79	-4.31		
1667			8.89	-4.29		
1666			8.82	-4.42		
1665			8.90	-4.38		
1664			8.87	-4.46		
1663			8.92	-4.54		
1662			8.91	-4.46		
1661			8.80	-4.49		

Table S4 – Ifaty-Tulear composite $\delta^{18}O_{seawater}$ reconstruction based on a Monte Carlo simulation (for details see methods).

year	Median $\delta^{18}O_{sw}$ (‰)	68% CI)		90% CI		95% CI		99% CI	
		16%	84%	5%	95%	2.5%	97.5%	0.5%	99.5%
1994	-0.31	-0.42	-0.20	-0.49	-0.13	-0.53	-0.10	-0.60	-0.03

1993	-0.24	-0.37	-0.12	-0.46	-0.04	-0.50	-0.01	-0.58	0.07
1992	-0.02	-0.13	0.09	-0.20	0.17	-0.23	0.21	-0.30	0.29
1991	-0.06	-0.18	0.06	-0.26	0.13	-0.29	0.17	-0.36	0.25
1990	-0.06	-0.16	0.03	-0.22	0.09	-0.25	0.12	-0.30	0.18
1989	-0.09	-0.19	0.01	-0.25	0.08	-0.28	0.11	-0.34	0.17
1988	-0.11	-0.26	0.06	-0.35	0.17	-0.40	0.23	-0.48	0.35
1987	0.02	-0.09	0.13	-0.16	0.19	-0.19	0.23	-0.26	0.29
1986	-0.09	-0.20	0.03	-0.27	0.10	-0.30	0.14	-0.36	0.21
1985	-0.13	-0.23	-0.02	-0.31	0.05	-0.34	0.08	-0.41	0.15
1984	-0.09	-0.25	0.05	-0.35	0.13	-0.40	0.17	-0.51	0.24
1983	0.01	-0.09	0.11	-0.15	0.17	-0.18	0.20	-0.24	0.26
1982	-0.03	-0.16	0.10	-0.24	0.19	-0.28	0.23	-0.35	0.31
1981	-0.37	-0.55	-0.21	-0.68	-0.11	-0.75	-0.06	-0.87	0.03
1980	-0.06	-0.26	0.14	-0.38	0.26	-0.44	0.32	-0.56	0.44
1979	0.02	-0.19	0.22	-0.33	0.34	-0.40	0.40	-0.52	0.52
1978	0.08	-0.03	0.19	-0.10	0.27	-0.14	0.30	-0.21	0.38
1977	0.11	0.01	0.21	-0.06	0.28	-0.09	0.32	-0.16	0.39
1976	0.07	-0.07	0.21	-0.16	0.30	-0.21	0.35	-0.29	0.43
1975	0.15	0.02	0.28	-0.05	0.37	-0.09	0.41	-0.15	0.48
1974	0.02	-0.10	0.14	-0.19	0.21	-0.23	0.24	-0.31	0.31
1973	0.06	-0.05	0.18	-0.12	0.25	-0.16	0.29	-0.22	0.35
1972	0.05	-0.08	0.18	-0.16	0.26	-0.20	0.30	-0.28	0.37
1971	-0.05	-0.17	0.07	-0.25	0.15	-0.28	0.19	-0.36	0.26
1970	0.04	-0.12	0.19	-0.22	0.27	-0.27	0.32	-0.38	0.39
1969	0.02	-0.08	0.12	-0.15	0.19	-0.19	0.22	-0.25	0.28
1968	-0.06	-0.19	0.06	-0.28	0.14	-0.32	0.17	-0.40	0.24
1967	0.03	-0.10	0.15	-0.17	0.24	-0.21	0.28	-0.28	0.35
1966	-0.07	-0.17	0.03	-0.23	0.09	-0.26	0.12	-0.32	0.19
1965	0.05	-0.04	0.15	-0.10	0.21	-0.13	0.24	-0.19	0.29
1964	0.10	-0.04	0.23	-0.12	0.31	-0.16	0.35	-0.24	0.43
1963	0.01	-0.11	0.13	-0.18	0.21	-0.22	0.25	-0.28	0.33
1962	0.16	0.06	0.27	-0.01	0.34	-0.04	0.38	-0.10	0.45
1961	0.22	0.09	0.36	-0.01	0.45	-0.05	0.49	-0.13	0.57
1960	0.06	-0.05	0.16	-0.11	0.24	-0.14	0.27	-0.21	0.34
1959	-0.13	-0.30	0.05	-0.41	0.16	-0.45	0.22	-0.54	0.34
1958	-0.05	-0.18	0.08	-0.27	0.17	-0.32	0.21	-0.40	0.28
1957	-0.05	-0.17	0.07	-0.24	0.15	-0.28	0.20	-0.34	0.28
1956	0.17	-0.01	0.36	-0.10	0.49	-0.15	0.55	-0.22	0.66
1955	-0.04	-0.27	0.17	-0.43	0.29	-0.50	0.34	-0.65	0.45
1954	-0.01	-0.16	0.14	-0.25	0.23	-0.30	0.28	-0.38	0.38
1953	-0.03	-0.13	0.08	-0.19	0.15	-0.22	0.19	-0.29	0.26
1952	0.04	-0.08	0.16	-0.17	0.23	-0.20	0.27	-0.28	0.33
1951	0.11	-0.04	0.24	-0.13	0.32	-0.17	0.36	-0.27	0.44

1950	-0.10	-0.25	0.05	-0.33	0.16	-0.38	0.21	-0.45	0.31
1949	-0.06	-0.15	0.03	-0.21	0.09	-0.24	0.12	-0.30	0.18
1948	0.01	-0.10	0.12	-0.16	0.19	-0.19	0.22	-0.26	0.29
1947	0.01	-0.12	0.14	-0.21	0.22	-0.25	0.26	-0.33	0.34
1946	0.04	-0.07	0.15	-0.14	0.22	-0.17	0.25	-0.24	0.33
1945	0.02	-0.12	0.15	-0.21	0.24	-0.25	0.28	-0.34	0.35
1944	-0.02	-0.18	0.14	-0.27	0.25	-0.31	0.31	-0.38	0.41
1943	-0.11	-0.23	0.00	-0.30	0.07	-0.34	0.11	-0.40	0.18
1942	0.08	-0.04	0.19	-0.11	0.26	-0.14	0.30	-0.21	0.37
1941	0.04	-0.08	0.16	-0.15	0.24	-0.18	0.28	-0.26	0.35
1940	0.03	-0.07	0.13	-0.13	0.19	-0.16	0.23	-0.22	0.29
1939	0.30	0.12	0.47	0.02	0.59	-0.03	0.65	-0.12	0.77
1938	0.39	0.23	0.54	0.14	0.63	0.09	0.68	0.00	0.78
1937	0.19	0.00	0.37	-0.12	0.50	-0.18	0.56	-0.28	0.67
1936	0.09	-0.04	0.24	-0.12	0.34	-0.16	0.40	-0.22	0.50
1935	0.17	-0.01	0.34	-0.11	0.45	-0.16	0.50	-0.26	0.60
1934	0.15	0.03	0.28	-0.05	0.36	-0.09	0.40	-0.16	0.47
1933	0.14	0.02	0.26	-0.06	0.34	-0.10	0.38	-0.17	0.46
1932	0.15	0.05	0.26	-0.02	0.33	-0.05	0.36	-0.11	0.42
1931	0.17	0.06	0.29	-0.01	0.36	-0.05	0.40	-0.11	0.47
1930	0.18	0.06	0.29	-0.02	0.37	-0.06	0.40	-0.13	0.47
1929	0.03	-0.09	0.14	-0.16	0.22	-0.20	0.25	-0.27	0.32
1928	0.20	0.02	0.38	-0.10	0.49	-0.15	0.55	-0.25	0.67
1927	0.20	0.04	0.35	-0.05	0.45	-0.10	0.49	-0.21	0.58
1926	0.09	-0.10	0.27	-0.22	0.38	-0.29	0.43	-0.42	0.54
1925	0.07	-0.10	0.23	-0.21	0.33	-0.27	0.36	-0.38	0.44
1924	0.20	0.08	0.31	0.02	0.38	-0.02	0.42	-0.09	0.50
1923	0.10	-0.06	0.26	-0.17	0.36	-0.21	0.41	-0.30	0.49
1922	0.12	-0.03	0.26	-0.13	0.34	-0.17	0.37	-0.27	0.43
1921	0.06	-0.16	0.27	-0.29	0.37	-0.37	0.42	-0.50	0.51
1920	0.09	-0.03	0.20	-0.11	0.27	-0.14	0.30	-0.23	0.37
1919	0.30	0.12	0.47	0.01	0.58	-0.04	0.63	-0.14	0.74
1918	0.12	-0.08	0.33	-0.20	0.46	-0.26	0.53	-0.36	0.66
1917	0.07	-0.03	0.18	-0.10	0.24	-0.13	0.28	-0.19	0.34
1916	0.26	0.13	0.38	0.06	0.45	0.02	0.49	-0.05	0.56
1915	0.09	-0.05	0.24	-0.15	0.33	-0.19	0.38	-0.28	0.45
1914	0.12	-0.02	0.28	-0.11	0.38	-0.16	0.44	-0.24	0.54
1913	0.21	0.12	0.31	0.06	0.37	0.03	0.40	-0.03	0.46
1912	0.28	0.12	0.45	0.02	0.57	-0.03	0.64	-0.11	0.76
1911	0.12	-0.05	0.30	-0.14	0.42	-0.18	0.48	-0.26	0.59
1910	0.01	-0.17	0.20	-0.29	0.32	-0.35	0.38	-0.46	0.48
1909	0.18	0.00	0.35	-0.12	0.46	-0.17	0.52	-0.28	0.62
1908	0.12	-0.09	0.34	-0.21	0.49	-0.25	0.56	-0.35	0.72

1907	-0.01	-0.19	0.16	-0.30	0.27	-0.36	0.32	-0.48	0.42
1906	0.13	-0.06	0.32	-0.17	0.46	-0.22	0.52	-0.31	0.65
1905	-0.07	-0.26	0.12	-0.37	0.25	-0.42	0.31	-0.53	0.43
1904	-0.04	-0.17	0.09	-0.25	0.17	-0.28	0.21	-0.35	0.27
1903	-0.06	-0.18	0.05	-0.27	0.12	-0.31	0.16	-0.41	0.22
1902	0.02	-0.09	0.13	-0.15	0.20	-0.19	0.24	-0.25	0.29
1901	-0.07	-0.18	0.03	-0.25	0.10	-0.28	0.13	-0.36	0.19
1900	0.13	-0.02	0.27	-0.10	0.36	-0.15	0.40	-0.23	0.47
1899	-0.19	-0.29	-0.08	-0.37	-0.01	-0.40	0.02	-0.49	0.08
1898	-0.02	-0.15	0.11	-0.23	0.19	-0.26	0.23	-0.33	0.29
1897	0.06	-0.07	0.19	-0.15	0.27	-0.19	0.31	-0.26	0.39
1896	0.16	0.07	0.24	0.01	0.30	-0.02	0.33	-0.06	0.38
1895	0.02	-0.20	0.25	-0.31	0.36	-0.35	0.40	-0.42	0.47
1894	0.04	-0.10	0.18	-0.20	0.27	-0.24	0.31	-0.31	0.39
1893	0.09	-0.08	0.26	-0.18	0.37	-0.22	0.42	-0.30	0.51
1892	0.07	-0.05	0.19	-0.12	0.27	-0.15	0.31	-0.22	0.39
1891	-0.16	-0.30	-0.01	-0.38	0.07	-0.42	0.11	-0.49	0.17
1890	-0.11	-0.25	0.04	-0.34	0.13	-0.38	0.17	-0.45	0.24
1889	0.14	0.01	0.26	-0.07	0.35	-0.11	0.38	-0.18	0.46
1888	-0.01	-0.31	0.28	-0.43	0.41	-0.48	0.47	-0.57	0.56
1887	0.14	-0.15	0.42	-0.31	0.60	-0.37	0.67	-0.46	0.80
1886	-0.09	-0.30	0.11	-0.42	0.23	-0.48	0.29	-0.58	0.38
1885	0.03	-0.21	0.27	-0.34	0.40	-0.39	0.46	-0.48	0.56
1884	0.34	0.01	0.65	-0.11	0.83	-0.15	0.90	-0.23	1.04
1883	0.02	-0.20	0.23	-0.31	0.34	-0.35	0.39	-0.43	0.46
1882	0.24	0.01	0.46	-0.11	0.61	-0.15	0.68	-0.23	0.81
1881	-0.18	-0.39	0.03	-0.52	0.16	-0.59	0.23	-0.72	0.37
1880	0.09	-0.12	0.31	-0.25	0.46	-0.32	0.53	-0.44	0.70
1879	-0.21	-0.42	0.00	-0.56	0.13	-0.63	0.20	-0.78	0.34
1878	-0.03	-0.24	0.18	-0.37	0.32	-0.45	0.39	-0.59	0.54
1877	-0.14	-0.35	0.07	-0.49	0.21	-0.56	0.27	-0.71	0.41
1876	-0.15	-0.36	0.06	-0.50	0.20	-0.57	0.27	-0.71	0.41
1875	-0.35	-0.56	-0.14	-0.70	0.00	-0.77	0.07	-0.91	0.21
1874	-0.30	-0.51	-0.09	-0.66	0.04	-0.73	0.11	-0.89	0.27
1873	-0.53	-0.76	-0.31	-0.91	-0.18	-1.01	-0.12	-1.19	0.00
1872	-0.37	-0.59	-0.17	-0.73	-0.03	-0.81	0.03	-0.96	0.17
1871	-0.07	-0.28	0.14	-0.41	0.29	-0.47	0.37	-0.61	0.54
1870	-0.18	-0.39	0.03	-0.53	0.17	-0.60	0.24	-0.76	0.37
1869	-0.09	-0.30	0.12	-0.44	0.25	-0.51	0.32	-0.66	0.46
1868	-0.23	-0.44	-0.02	-0.58	0.12	-0.64	0.18	-0.80	0.32
1867	-0.17	-0.38	0.04	-0.52	0.17	-0.60	0.24	-0.74	0.36
1866	0.09	-0.12	0.30	-0.25	0.44	-0.32	0.51	-0.45	0.67
1865	-0.42	-0.65	-0.20	-0.81	-0.07	-0.89	0.00	-1.07	0.12

1864	-0.20	-0.41	0.01	-0.55	0.15	-0.63	0.21	-0.78	0.33
1863	-0.22	-0.43	-0.01	-0.58	0.12	-0.66	0.19	-0.83	0.31
1862	-0.07	-0.29	0.14	-0.44	0.27	-0.51	0.33	-0.67	0.46
1861	-0.44	-0.66	-0.23	-0.82	-0.09	-0.90	-0.03	-1.07	0.10
1860	-0.18	-0.40	0.02	-0.54	0.16	-0.61	0.22	-0.76	0.36
1859	-0.19	-0.40	0.02	-0.54	0.16	-0.61	0.22	-0.76	0.36
1858	-0.29	-0.51	-0.09	-0.65	0.04	-0.72	0.11	-0.86	0.24
1857	-0.32	-0.54	-0.12	-0.67	0.02	-0.75	0.09	-0.90	0.22
1856	0.06	-0.15	0.27	-0.28	0.42	-0.35	0.49	-0.47	0.64
1855	0.03	-0.18	0.24	-0.32	0.37	-0.39	0.44	-0.52	0.59
1854	-0.18	-0.39	0.03	-0.54	0.17	-0.61	0.23	-0.76	0.36
1853	-0.24	-0.46	-0.03	-0.60	0.11	-0.68	0.18	-0.85	0.30
1852	-0.31	-0.54	-0.10	-0.69	0.03	-0.77	0.10	-0.94	0.24
1851	-0.05	-0.26	0.16	-0.41	0.29	-0.48	0.36	-0.63	0.49
1850	-0.11	-0.33	0.09	-0.47	0.23	-0.54	0.30	-0.72	0.43
1849	-0.06	-0.27	0.15	-0.41	0.29	-0.48	0.36	-0.63	0.49
1848	-0.01	-0.23	0.19	-0.37	0.33	-0.45	0.40	-0.60	0.53
1847	-0.12	-0.33	0.09	-0.48	0.22	-0.55	0.29	-0.72	0.41
1846	-0.30	-0.53	-0.10	-0.68	0.04	-0.76	0.10	-0.91	0.23
1845	-0.01	-0.22	0.20	-0.36	0.34	-0.43	0.41	-0.59	0.57
1844	-0.04	-0.25	0.17	-0.38	0.31	-0.45	0.38	-0.58	0.53
1843	-0.07	-0.28	0.14	-0.41	0.28	-0.48	0.35	-0.63	0.49
1842	-0.04	-0.25	0.17	-0.39	0.31	-0.46	0.38	-0.59	0.51
1841	-0.18	-0.39	0.03	-0.54	0.16	-0.62	0.23	-0.80	0.36
1840	-0.25	-0.46	-0.04	-0.60	0.09	-0.67	0.16	-0.83	0.30
1839	0.02	-0.19	0.23	-0.33	0.36	-0.39	0.43	-0.53	0.57
1838	-0.25	-0.47	-0.04	-0.62	0.10	-0.70	0.16	-0.86	0.28
1837	0.04	-0.18	0.25	-0.32	0.38	-0.40	0.45	-0.55	0.58
1836	-0.13	-0.34	0.08	-0.48	0.21	-0.56	0.28	-0.72	0.40
1835	-0.43	-0.65	-0.22	-0.80	-0.08	-0.88	-0.02	-1.05	0.10
1834	-0.15	-0.36	0.06	-0.51	0.20	-0.58	0.26	-0.74	0.39
1833	0.01	-0.20	0.22	-0.34	0.36	-0.41	0.43	-0.55	0.57
1832	0.09	-0.12	0.30	-0.26	0.44	-0.33	0.51	-0.46	0.65
1831	-0.27	-0.48	-0.06	-0.62	0.07	-0.70	0.14	-0.85	0.26
1830	0.06	-0.15	0.27	-0.30	0.41	-0.36	0.47	-0.50	0.61
1829	-0.18	-0.39	0.03	-0.54	0.16	-0.61	0.23	-0.77	0.35
1828	-0.08	-0.29	0.13	-0.42	0.26	-0.50	0.33	-0.63	0.46
1827	-0.03	-0.24	0.18	-0.38	0.33	-0.45	0.39	-0.58	0.53
1826	-0.25	-0.46	-0.04	-0.60	0.10	-0.68	0.17	-0.83	0.31
1825	-0.16	-0.37	0.05	-0.51	0.19	-0.58	0.25	-0.72	0.39
1824	-0.20	-0.42	0.01	-0.57	0.14	-0.64	0.20	-0.80	0.34
1823	-0.40	-0.63	-0.19	-0.78	-0.05	-0.86	0.01	-1.04	0.14
1822	-0.09	-0.30	0.12	-0.44	0.26	-0.50	0.33	-0.64	0.47

1821	-0.66	-0.90	-0.44	-1.07	-0.30	-1.17	-0.24	-1.35	-0.12
1820	-0.12	-0.33	0.09	-0.47	0.23	-0.54	0.29	-0.68	0.43
1819	-0.24	-0.46	-0.03	-0.60	0.10	-0.67	0.17	-0.84	0.29
1818	-0.23	-0.45	-0.02	-0.59	0.11	-0.67	0.17	-0.83	0.31
1817	-0.25	-0.47	-0.05	-0.61	0.08	-0.68	0.15	-0.84	0.28
1816	-0.39	-0.61	-0.18	-0.77	-0.04	-0.85	0.02	-1.04	0.15
1815	-0.07	-0.28	0.14	-0.42	0.27	-0.49	0.34	-0.63	0.48
1814	-0.29	-0.50	-0.08	-0.65	0.06	-0.73	0.12	-0.88	0.25
1813	-0.29	-0.51	-0.09	-0.66	0.04	-0.73	0.11	-0.87	0.24
1812	-0.26	-0.47	-0.05	-0.61	0.08	-0.68	0.15	-0.83	0.29
1811	-0.30	-0.51	-0.09	-0.65	0.04	-0.73	0.11	-0.88	0.25
1810	-0.29	-0.50	-0.08	-0.64	0.06	-0.71	0.13	-0.85	0.27
1809	-0.16	-0.37	0.05	-0.50	0.19	-0.57	0.26	-0.71	0.40
1808	-0.02	-0.23	0.19	-0.37	0.33	-0.43	0.40	-0.57	0.54
1807	-0.16	-0.36	0.05	-0.50	0.19	-0.57	0.26	-0.72	0.40
1806	-0.33	-0.55	-0.12	-0.70	0.01	-0.77	0.08	-0.93	0.22
1805	-0.06	-0.28	0.15	-0.41	0.28	-0.48	0.35	-0.62	0.49
1804	-0.31	-0.53	-0.10	-0.68	0.03	-0.75	0.09	-0.91	0.21
1803	-0.16	-0.37	0.05	-0.51	0.19	-0.58	0.26	-0.75	0.40
1802	-0.26	-0.47	-0.05	-0.62	0.08	-0.69	0.15	-0.84	0.29
1801	-0.38	-0.60	-0.18	-0.76	-0.05	-0.83	0.02	-0.98	0.15
1800	-0.32	-0.54	-0.11	-0.69	0.02	-0.77	0.08	-0.94	0.21
1799	-0.52	-0.75	-0.31	-0.90	-0.18	-0.99	-0.11	-1.15	0.03
1798	-0.22	-0.43	-0.01	-0.56	0.13	-0.63	0.20	-0.77	0.34
1797	-0.28	-0.49	-0.07	-0.64	0.06	-0.72	0.13	-0.87	0.26
1796	-0.03	-0.25	0.18	-0.38	0.31	-0.46	0.38	-0.59	0.53
1795	-0.62	-0.85	-0.40	-1.01	-0.27	-1.09	-0.21	-1.26	-0.09
1794	-0.21	-0.42	0.00	-0.57	0.12	-0.64	0.19	-0.78	0.33
1793	-0.25	-0.47	-0.05	-0.61	0.08	-0.69	0.15	-0.83	0.28
1792	-0.30	-0.51	-0.09	-0.66	0.04	-0.74	0.11	-0.89	0.25
1791	-0.17	-0.38	0.04	-0.52	0.17	-0.59	0.24	-0.74	0.37
1790	-0.01	-0.22	0.20	-0.36	0.33	-0.43	0.41	-0.58	0.55
1789	0.12	-0.09	0.34	-0.23	0.48	-0.29	0.55	-0.41	0.70
1788	-0.28	-0.50	-0.07	-0.66	0.06	-0.73	0.13	-0.89	0.26
1787	-0.35	-0.58	-0.14	-0.74	-0.01	-0.81	0.05	-0.97	0.18
1786	-0.21	-0.43	0.00	-0.57	0.14	-0.65	0.20	-0.80	0.33
1785	-0.16	-0.38	0.04	-0.52	0.18	-0.60	0.24	-0.76	0.38
1784	-0.57	-0.79	-0.35	-0.96	-0.22	-1.04	-0.16	-1.23	-0.03
1783	-0.20	-0.41	0.01	-0.55	0.14	-0.62	0.21	-0.76	0.36
1782	0.10	-0.11	0.32	-0.24	0.46	-0.31	0.53	-0.43	0.70
1781	0.14	-0.06	0.36	-0.20	0.49	-0.27	0.56	-0.42	0.71
1780	-0.22	-0.45	-0.01	-0.60	0.12	-0.68	0.19	-0.85	0.30
1779	-0.26	-0.48	-0.05	-0.62	0.08	-0.69	0.15	-0.85	0.28

1778	-0.06	-0.27	0.15	-0.41	0.28	-0.48	0.35	-0.64	0.49
1777	0.03	-0.17	0.24	-0.31	0.39	-0.37	0.46	-0.52	0.62
1776	-0.24	-0.45	-0.03	-0.59	0.10	-0.66	0.17	-0.80	0.30
1775	-0.23	-0.44	-0.02	-0.58	0.12	-0.65	0.18	-0.79	0.33
1774	0.11	-0.10	0.32	-0.24	0.47	-0.30	0.54	-0.43	0.69
1773	0.06	-0.15	0.27	-0.29	0.41	-0.35	0.48	-0.48	0.62
1772	-0.29	-0.49	-0.08	-0.64	0.06	-0.72	0.13	-0.87	0.27
1771	-0.11	-0.32	0.10	-0.45	0.25	-0.52	0.32	-0.66	0.47
1770	-0.07	-0.28	0.14	-0.41	0.29	-0.47	0.36	-0.61	0.51
1769	-0.21	-0.43	0.00	-0.57	0.13	-0.64	0.20	-0.79	0.34
1768	0.15	-0.06	0.36	-0.18	0.51	-0.25	0.58	-0.38	0.72
1767	0.10	-0.11	0.31	-0.25	0.45	-0.32	0.52	-0.45	0.66
1766	-0.17	-0.38	0.04	-0.52	0.17	-0.60	0.24	-0.75	0.38
1765	-0.25	-0.48	-0.05	-0.64	0.09	-0.72	0.15	-0.92	0.28
1764	-0.12	-0.33	0.09	-0.47	0.22	-0.54	0.29	-0.69	0.42
1763	-0.21	-0.43	0.00	-0.57	0.13	-0.65	0.20	-0.80	0.33
1762	0.11	-0.09	0.32	-0.24	0.46	-0.31	0.52	-0.45	0.66
1761	-0.01	-0.23	0.19	-0.37	0.33	-0.45	0.39	-0.61	0.53
1760	-0.18	-0.39	0.03	-0.54	0.17	-0.61	0.23	-0.76	0.37
1759	-0.36	-0.59	-0.15	-0.75	-0.02	-0.84	0.05	-1.01	0.18
1758	-0.16	-0.38	0.04	-0.52	0.18	-0.60	0.24	-0.77	0.37
1757	0.09	-0.12	0.30	-0.25	0.44	-0.32	0.51	-0.45	0.66
1756	-0.21	-0.42	0.00	-0.57	0.14	-0.64	0.21	-0.81	0.33
1755	-0.40	-0.62	-0.19	-0.78	-0.06	-0.87	0.01	-1.06	0.13
1754	-0.22	-0.43	-0.01	-0.59	0.12	-0.66	0.18	-0.84	0.31
1753	-0.16	-0.37	0.06	-0.51	0.20	-0.58	0.26	-0.73	0.40
1752	-0.27	-0.50	-0.06	-0.65	0.07	-0.73	0.14	-0.89	0.26
1751	0.03	-0.18	0.24	-0.32	0.37	-0.40	0.44	-0.54	0.58
1750	-0.26	-0.47	-0.05	-0.62	0.09	-0.71	0.16	-0.88	0.28
1749	-0.01	-0.22	0.20	-0.36	0.34	-0.43	0.41	-0.57	0.55
1748	-0.12	-0.33	0.09	-0.47	0.22	-0.54	0.29	-0.70	0.43
1747	-0.18	-0.40	0.03	-0.54	0.17	-0.62	0.23	-0.79	0.36
1746	-0.04	-0.27	0.17	-0.42	0.30	-0.50	0.37	-0.65	0.49
1745	-0.06	-0.27	0.15	-0.41	0.29	-0.49	0.35	-0.63	0.50
1744	-0.15	-0.36	0.06	-0.50	0.20	-0.58	0.26	-0.74	0.38
1743	-0.15	-0.37	0.06	-0.51	0.19	-0.58	0.25	-0.74	0.39
1742	-0.15	-0.36	0.06	-0.51	0.20	-0.58	0.26	-0.75	0.40
1741	-0.21	-0.43	0.00	-0.58	0.13	-0.65	0.20	-0.81	0.33
1740	-0.04	-0.26	0.16	-0.40	0.29	-0.47	0.36	-0.63	0.48
1739	-0.10	-0.31	0.11	-0.46	0.24	-0.53	0.30	-0.67	0.44
1738	-0.26	-0.48	-0.05	-0.63	0.09	-0.71	0.16	-0.89	0.27
1737	0.07	-0.14	0.27	-0.27	0.41	-0.34	0.49	-0.49	0.65
1736	-0.42	-0.65	-0.21	-0.81	-0.08	-0.89	-0.01	-1.06	0.12

1735	-0.18	-0.39	0.03	-0.53	0.17	-0.60	0.23	-0.76	0.36
1734	0.08	-0.14	0.29	-0.29	0.42	-0.36	0.49	-0.51	0.62
1733	-0.18	-0.40	0.03	-0.56	0.17	-0.63	0.23	-0.81	0.36
1732	-0.16	-0.38	0.05	-0.53	0.18	-0.61	0.24	-0.77	0.38
1731	0.06	-0.15	0.27	-0.29	0.40	-0.37	0.46	-0.53	0.60
1730	-0.05	-0.26	0.16	-0.40	0.30	-0.47	0.37	-0.64	0.50
1729	-0.20	-0.42	0.01	-0.58	0.14	-0.66	0.20	-0.83	0.32
1728	0.00	-0.21	0.21	-0.36	0.34	-0.43	0.41	-0.58	0.55
1727	-0.07	-0.30	0.14	-0.45	0.27	-0.54	0.34	-0.71	0.47
1726	-0.15	-0.37	0.06	-0.52	0.19	-0.60	0.26	-0.76	0.40
1725	-0.33	-0.56	-0.13	-0.71	0.01	-0.78	0.08	-0.94	0.21
1724	-0.12	-0.33	0.09	-0.47	0.22	-0.54	0.29	-0.68	0.43
1723	-0.06	-0.27	0.15	-0.41	0.29	-0.48	0.36	-0.61	0.49
1722	-0.13	-0.34	0.08	-0.48	0.22	-0.55	0.28	-0.70	0.42
1721	-0.11	-0.33	0.09	-0.47	0.23	-0.55	0.30	-0.70	0.43
1720	-0.04	-0.26	0.17	-0.40	0.30	-0.47	0.37	-0.62	0.49
1719	0.07	-0.15	0.28	-0.30	0.41	-0.38	0.48	-0.54	0.61
1718	-0.16	-0.38	0.05	-0.54	0.19	-0.62	0.25	-0.80	0.38
1717	0.28	0.07	0.49	-0.07	0.62	-0.14	0.69	-0.28	0.82
1716	-0.31	-0.54	-0.10	-0.69	0.03	-0.77	0.09	-0.96	0.23
1715	0.45	0.24	0.67	0.11	0.81	0.04	0.89	-0.09	1.05
1714	-0.04	-0.26	0.17	-0.41	0.30	-0.49	0.37	-0.64	0.49
1713	0.14	-0.07	0.35	-0.20	0.50	-0.27	0.57	-0.40	0.71
1712	0.02	-0.20	0.23	-0.33	0.36	-0.40	0.43	-0.55	0.56
1711	0.11	-0.11	0.32	-0.26	0.45	-0.33	0.52	-0.50	0.65
1710	-0.25	-0.47	-0.04	-0.63	0.10	-0.71	0.17	-0.87	0.30
1709	-0.75	-1.00	-0.53	-1.17	-0.39	-1.27	-0.32	-1.48	-0.19
1708	-0.48	-0.73	-0.26	-0.90	-0.12	-0.99	-0.06	-1.20	0.07
1707	-0.34	-0.57	-0.12	-0.73	0.02	-0.82	0.09	-1.03	0.21
1706	-0.01	-0.22	0.20	-0.36	0.33	-0.43	0.40	-0.59	0.53
1705	0.11	-0.10	0.32	-0.24	0.47	-0.30	0.53	-0.44	0.68
1704	0.27	0.06	0.48	-0.08	0.63	-0.14	0.71	-0.27	0.86
1703	0.33	0.13	0.54	-0.01	0.69	-0.08	0.76	-0.21	0.91
1702	-0.15	-0.36	0.06	-0.51	0.20	-0.59	0.26	-0.75	0.39
1701	-0.18	-0.41	0.03	-0.57	0.16	-0.66	0.23	-0.83	0.36
1700	-0.09	-0.31	0.12	-0.46	0.26	-0.54	0.33	-0.71	0.45
1699	-0.13	-0.36	0.08	-0.51	0.21	-0.59	0.28	-0.76	0.40
1698	-0.23	-0.45	-0.02	-0.60	0.11	-0.69	0.17	-0.85	0.31
1697	0.18	-0.03	0.39	-0.18	0.52	-0.25	0.59	-0.42	0.74
1696	0.50	0.29	0.71	0.16	0.86	0.09	0.93	-0.04	1.09
1695	-0.61	-0.86	-0.40	-1.03	-0.26	-1.12	-0.19	-1.31	-0.06
1694	0.39	0.18	0.60	0.05	0.74	-0.02	0.82	-0.16	0.96
1693	0.04	-0.17	0.24	-0.31	0.39	-0.38	0.45	-0.52	0.59

1692	0.26	0.04	0.48	-0.09	0.62	-0.15	0.70	-0.29	0.85
1691	0.07	-0.13	0.29	-0.27	0.43	-0.34	0.50	-0.47	0.64
1690	0.23	0.02	0.44	-0.12	0.60	-0.19	0.67	-0.31	0.83
1689	0.20	-0.01	0.42	-0.14	0.56	-0.20	0.63	-0.34	0.77
1688	0.02	-0.19	0.23	-0.34	0.36	-0.41	0.43	-0.56	0.56
1687	-0.16	-0.37	0.05	-0.52	0.18	-0.59	0.25	-0.74	0.39
1686	0.27	0.07	0.48	-0.07	0.62	-0.14	0.69	-0.28	0.82
1685	-0.09	-0.31	0.12	-0.47	0.25	-0.55	0.32	-0.70	0.44
1684	0.12	-0.09	0.33	-0.23	0.47	-0.30	0.54	-0.44	0.68
1683	-0.14	-0.35	0.07	-0.51	0.20	-0.57	0.27	-0.73	0.40
1682	0.05	-0.16	0.26	-0.30	0.40	-0.36	0.47	-0.50	0.62
1681	-0.23	-0.44	-0.02	-0.58	0.11	-0.66	0.18	-0.81	0.30
1680	-0.26	-0.47	-0.05	-0.63	0.09	-0.71	0.16	-0.86	0.28
1679	-0.27	-0.48	-0.06	-0.63	0.07	-0.70	0.14	-0.87	0.28
1678	-0.63	-0.86	-0.41	-1.03	-0.28	-1.12	-0.21	-1.31	-0.08
1677	-0.24	-0.45	-0.03	-0.59	0.11	-0.66	0.18	-0.82	0.32
1676	-0.24	-0.47	-0.03	-0.62	0.10	-0.70	0.17	-0.86	0.30
1675	-0.46	-0.69	-0.24	-0.86	-0.10	-0.95	-0.04	-1.13	0.09
1674	0.05	-0.16	0.26	-0.30	0.40	-0.37	0.47	-0.51	0.59
1673	-0.09	-0.31	0.11	-0.46	0.24	-0.53	0.31	-0.70	0.44
1672	-0.09	-0.30	0.12	-0.44	0.25	-0.51	0.32	-0.65	0.47
1671	-0.31	-0.52	-0.10	-0.66	0.03	-0.74	0.10	-0.89	0.23
1670	-0.16	-0.37	0.05	-0.51	0.18	-0.58	0.25	-0.72	0.38
1669	-0.11	-0.32	0.10	-0.46	0.23	-0.53	0.30	-0.68	0.44
1668	0.29	0.08	0.50	-0.05	0.65	-0.11	0.73	-0.24	0.88
1667	-0.06	-0.27	0.15	-0.42	0.28	-0.49	0.35	-0.65	0.48
1666	0.07	-0.14	0.28	-0.28	0.42	-0.35	0.50	-0.48	0.64
1665	-0.19	-0.41	0.02	-0.56	0.16	-0.63	0.23	-0.80	0.35
1664	-0.16	-0.37	0.05	-0.52	0.18	-0.59	0.25	-0.74	0.38
1663	-0.42	-0.65	-0.22	-0.80	-0.09	-0.88	-0.02	-1.05	0.11
1662	-0.28	-0.50	-0.08	-0.66	0.06	-0.73	0.13	-0.90	0.25
1661	0.05	-0.16	0.26	-0.29	0.40	-0.36	0.48	-0.49	0.61